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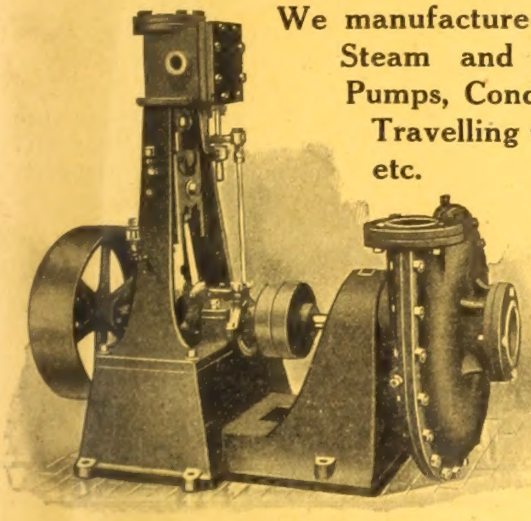
Vol. 26 Toronto, April 3, 1912 No. 14

APR 3 1912

ESTABLISHED 1886

Contract Record and Engineering Review



We manufacture Steam and Power Pumps, Condensers, Travelling Cranes, etc.

Write for Catalogue

The Smart-Turner Machine Company Limited
HAMILTON, ONTARIO

"MADE IN CANADA"

Bent Glass

Made in all Kinds of Glass on Short Notice

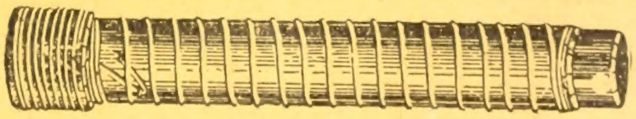
Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
(HILL & RUTHERFORD, Managing Directors)
Head Office and Works: 91 to 133 Don Roadway
TORONTO

Rand Machinery has back of it the reputation of the largest pneumatic machinery company in Canada.

COMPRESSORS RIVETERS

Canadian RAND Co. Limited
Commercial Union Bldg., MONTREAL, CAN.



Continuous and Machine Banded Wood Stave

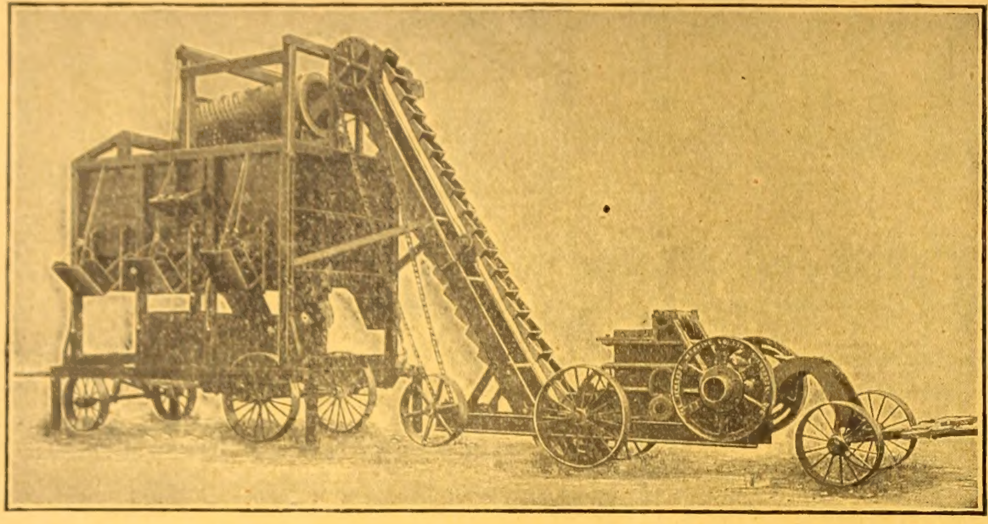
WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished

Alphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6



Capacity 150 tons in 10 hours.

Size of Crusher 9″ x 16. Will crush to 1½″.

Complete

Crushing Plants

including

Portable Boiler and Engine

This cut reproduced from a photograph will give one a good idea of a neat and compact plant.

We have been in the crusher business for years, and our past experience is at your disposal.

The Jenckes Machine Co., Limited

General Offices: Sherbrooke, Que.

Works: Sherbrooke, Que. St. Catharines, Ont.

Sales Offices:—Sherbrooke, St. Catharines, Montreal, Cobalt, So. Porcupine, Vancouver

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THE VERY FIRST THING

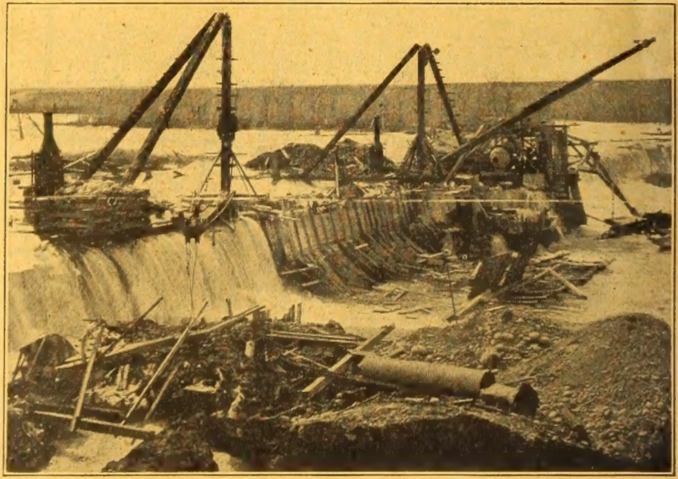
that Contractors, Engineers, Quarrymen, etc., speak of when they see

"AMERICAN" DERRICK IRONS

IS THEIR EXCELLENT APPEARANCE

After much experience these people tell us that

No better or longer wearing castings could be made



Black Rock Harbour Improvement near Buffalo, N.Y.

MacArthur Bros. Co., Contractors, Chicago, Ill.

There are no putty filled holes painted over to cover up defects. They will do more than is expected of them **all the time**

They only cost a few dollars more than others.

It will be worth your while to get full and complete information from us on details that may affect your profits.

WRITE US FULLY.

American Hoist & Derrick Co.

St. Paul, U.S.A.

Gorman, Clancey & Grindley, Edmonton and Calgary, Alta. and Nelson, B.C.
Vancouver Machinery Depot, Ltd., Vancouver, B.C.; Stuart Machinery Co., Ltd.,
Winnipeg, Man.

American Hoist & Derrick Co., St. Paul, Minn
Please send us Prices and Information
on "AMERICAN" Derricks.
....
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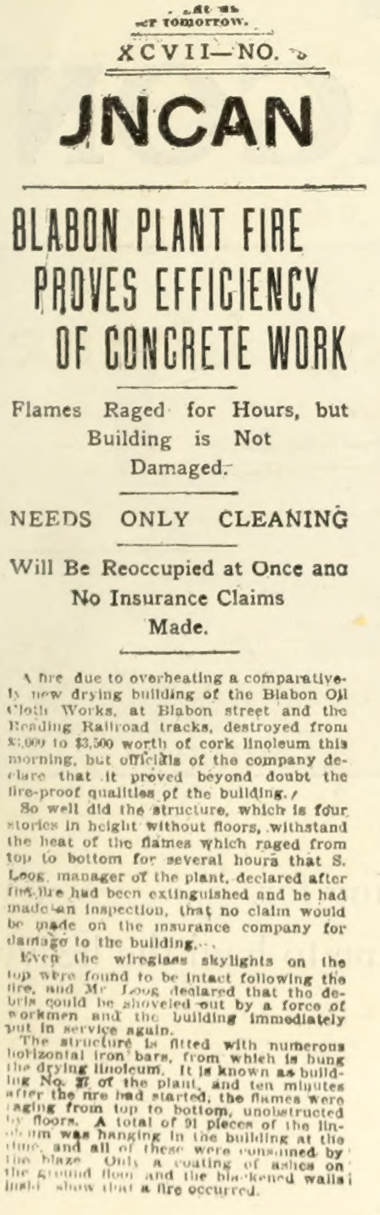
4-3-12

An Unsolicited Testimonial in Support of This Book—



TOMORROW.

XCVII—NO.

JNCAN

BLABON PLANT FIRE PROVES EFFICIENCY OF CONCRETE WORK

Flames Raged for Hours, but Building is Not Damaged.

NEEDS ONLY CLEANING

Will Be Reoccupied at Once and No Insurance Claims Made.

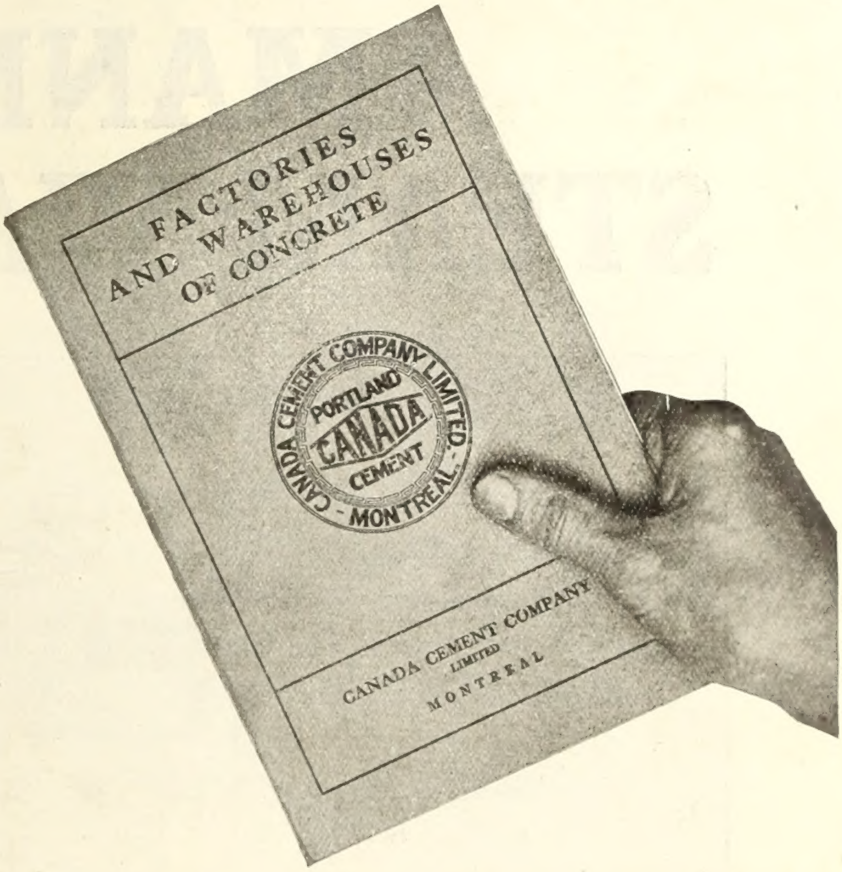
A fire due to overheating a comparatively new drying building of the Blabon Oil Cloth Works, at Blabon street and the Reading Railroad tracks, destroyed from $2,000 to $3,500 worth of cork linoleum this morning, but officials of the company declare that it proved beyond doubt the fire-proof qualities of the building.

So well did the structure, which is four stories in height without floors, withstand the heat of the flames which raged from top to bottom for several hours that S. Loog, manager of the plant, declared after the fire had been extinguished and he had made an inspection, that no claim would be made on the insurance company for damage to the building.

Even the wireglass skylights on the top were found to be intact following the fire, and Mr. Loog declared that the debris could be shoveled out by a force of workmen and the building immediately put in service again.

The structure is fitted with numerous horizontal iron bars, from which is hung the drying linoleum. It is known as building No. 27 of the plant, and ten minutes after the fire had started, the flames were raging from top to bottom, unobstructed by floors. A total of 91 pieces of the linoleum was hanging in the building at the time, and all of these were consumed by the blaze. Only a coating of ashes on the ground floor and the blackened walls inside show that a fire occurred.

The article reproduced above appeared as a news item on the first page of the Philadelphia Evening Telegraph, issue February 3rd, 1912. Could there be more striking proof of the value of reinforced concrete fireproof construction.


FACTORIES AND WAREHOUSES OF CONCRETE
CANADA CEMENT COMPANY LIMITED
PORTLAND CANADA CEMENT
MONTREAL
CANADA CEMENT COMPANY LIMITED
MONTREAL

"FACTORIES and Warehouses of Concrete" is the title of this new book which we are distributing to the architects, contractors, engineers, and manufacturers of Canada.

It is the most comprehensive work on the subject of modern fireproof factory and warehouse construction ever written. It contains actual photographs of two hundred and thirty buildings, covering a wide range of architectural types—full data on each building, giving the cost per square foot, per cubic foot, window area, loading, insurance, etc.,—and fac-simile letters from manufacturers occupying these buildings, telling of their **experience** with concrete factories.

There is also an authoritative general discussion of re-inforced concrete construction—which every man interested in building will find valuable and instructive.

No architect, contractor, engineer, or manufacturer can afford to be without this book.

It will be mailed to any business man who asks for it, enclosing twelve cents in stamps to pay postage.

Address:

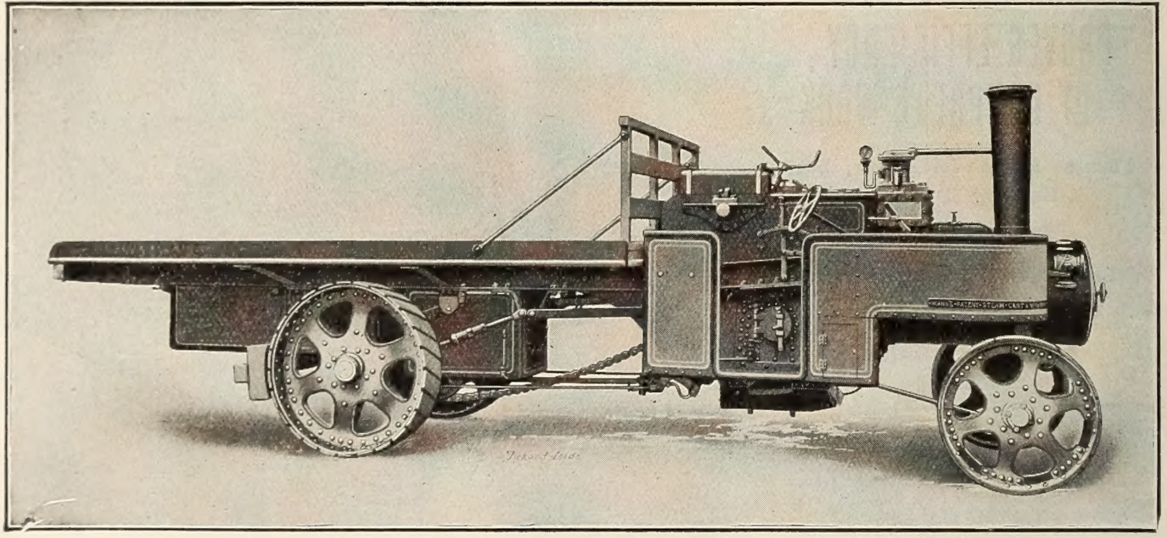
CANADA CEMENT CO., LIMITED

No. 61 National Bank Building, MONTREAL

5 to 7 Tons Load Hauled

with the

MANN STEAM WAGON



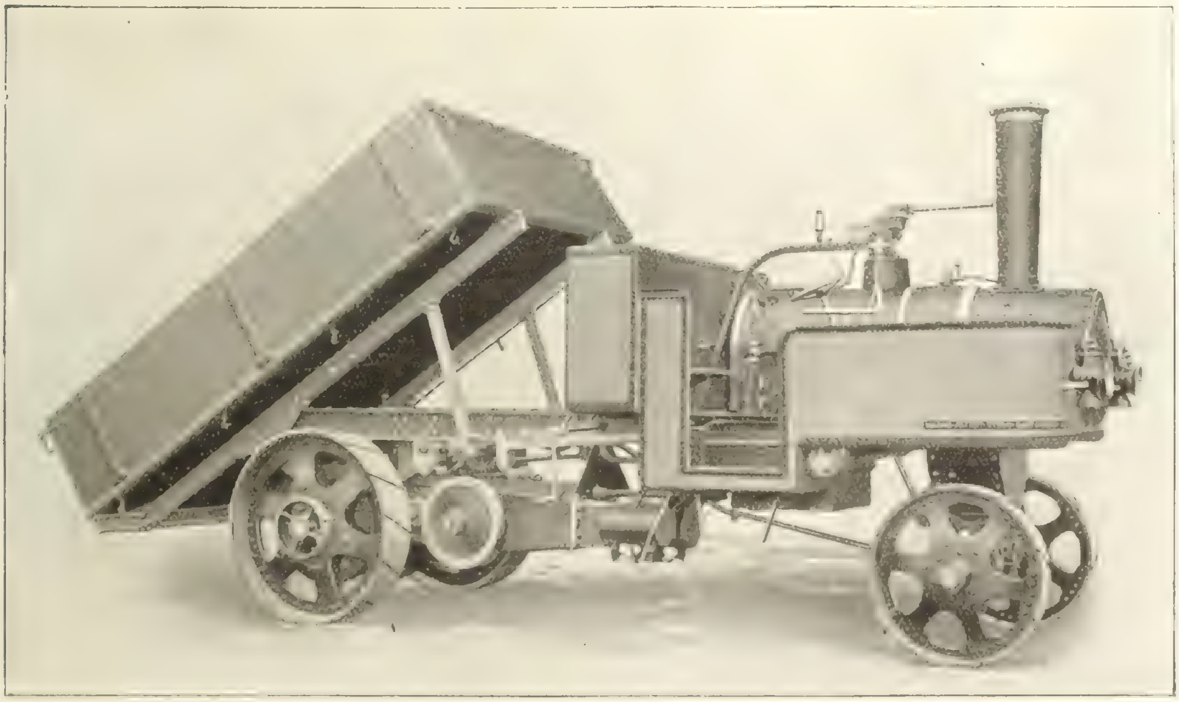
The Power Wagon you have been looking for.
You can always depend on a steam engine to haul the heavy loads.
No expensive rubber tyres to keep up.
Steel tyres, 10 inches wide.

Montreal, 318 St. James St.
Toronto, 73 Victoria St.
Cobalt, opp. Right of Way Mine.

MUSSENS

A Tipping Wagon

For hauling Crushed Stone, Coal, etc.
Body has hinged sides and fitted with special tipping gear.



Wagons for 2 - 3 - 5 - 7 tons
Will also haul a trailer in addition to its load.

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(Continued on page 12)

DON VALLEY BRICKS

Residence of Mr. J. C. Eaton, Toronto. Messrs. Wickson & Gregg, Architects

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

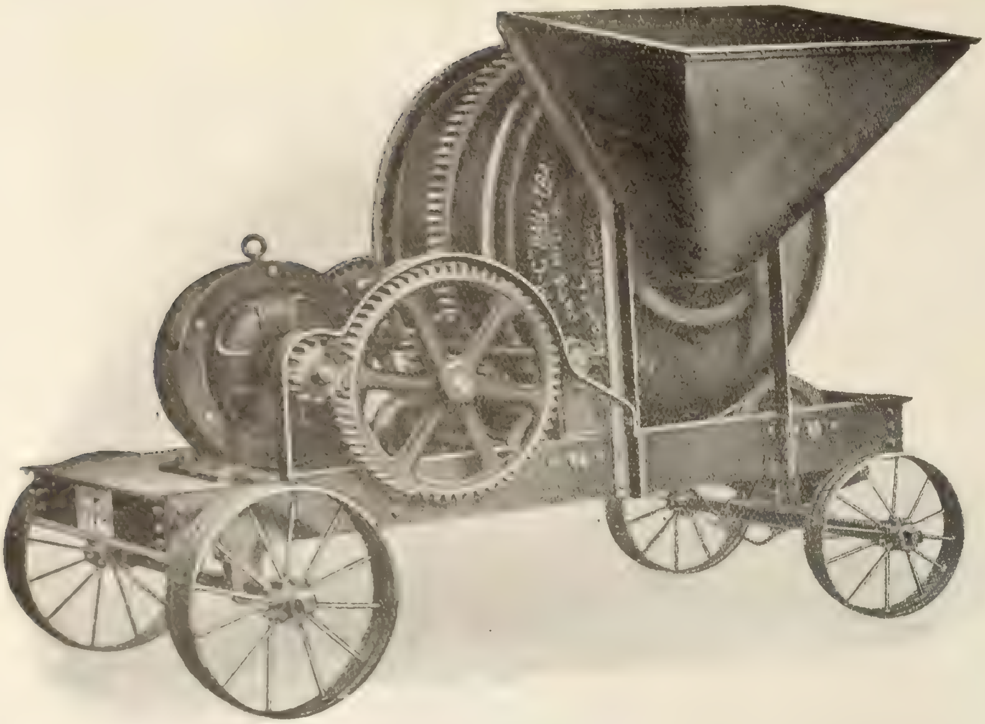
¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**



It's the Details which put this machine head and shoulders above all others.

Get the Catalogue
and find out
WHY
for yourself

Turn last year's repair bills into a bank account this year by using

The M-C Mixer

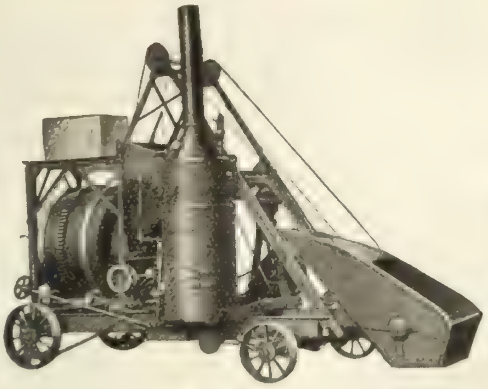
which reduces repairs to a negligible quantity.

Investigate Anyway

Do this to-day by spending postage on a letter to

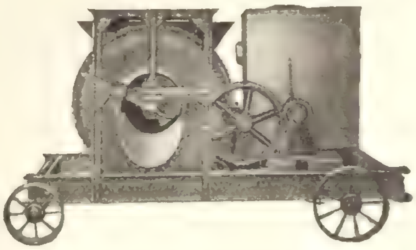
The Ford Iron Co.
Limited
Montreal

Most Mixing Least Fixing



London Paving Machine with front loader

London Concrete Machinery



London Standard Batch Mixer with Charging bin, Gasoline Power

is built up to a standard.

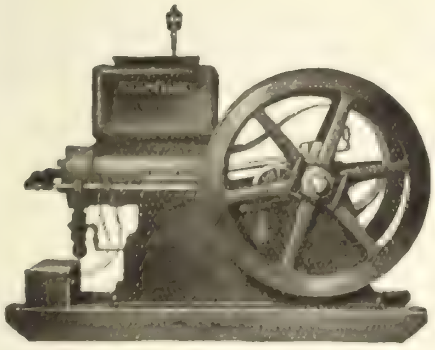
CONTRACTORS, **it is worth something to you** to know that when you use the LONDON MACHINES you have an equipment which is not a back number.

All OUR MACHINES are built by UP-TO-DATE METHODS. The MANY NEW and IMPROVED FEATURES of the LONDON MACHINES place them in A CLASS by themselves.

London face down Concrete Block Machine

WE ARE SAVING THE CONTRACTOR money in first the COST OF MACHINE, COST OF OPERATING, COST OF MAINTENANCE. Everything made in our own shops. We sell direct to the contractor.

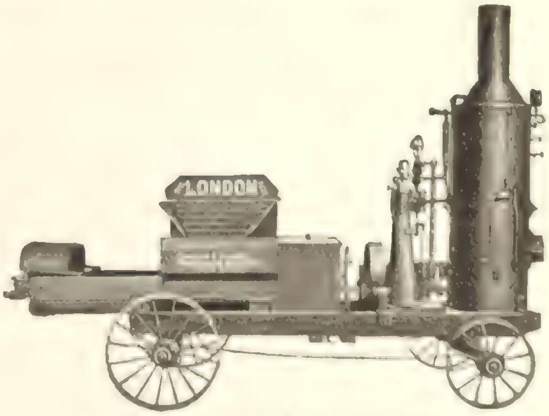
We are the only large Canadian Firm who specialize on Concrete Machinery.



Standard Gas Engine made in all sizes

Send for
1912
Catalogue

stating LINE interested in. We manufacture a full line of Concrete Machinery and Cement Working tools.



London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS .

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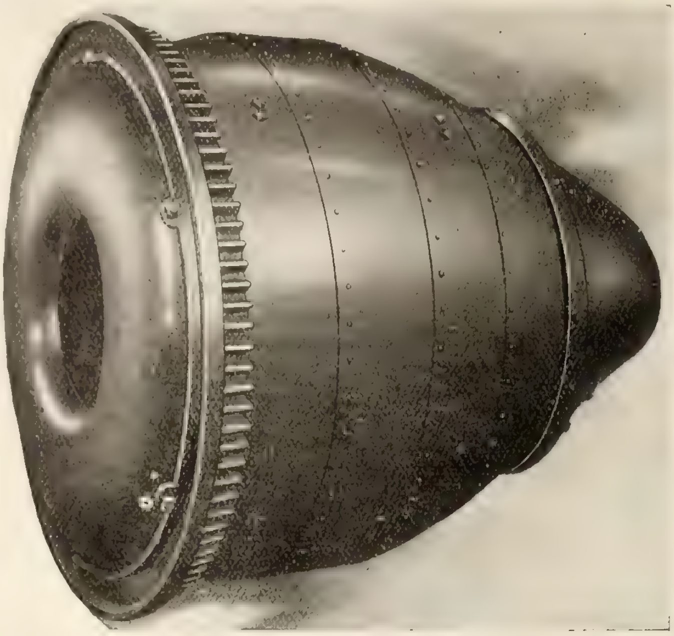
B. C. Equipment Co., Suite 606-607 Bank of Ottawa Bldg., Vancouver Hamilton Machinery Co., Calgary.
London Concrete Machinery Co. (W. H. Rosevear, Manager,) 445 Main St. Winnipeg.
We are the Largest Manufacturers of Concrete Machinery in Canada

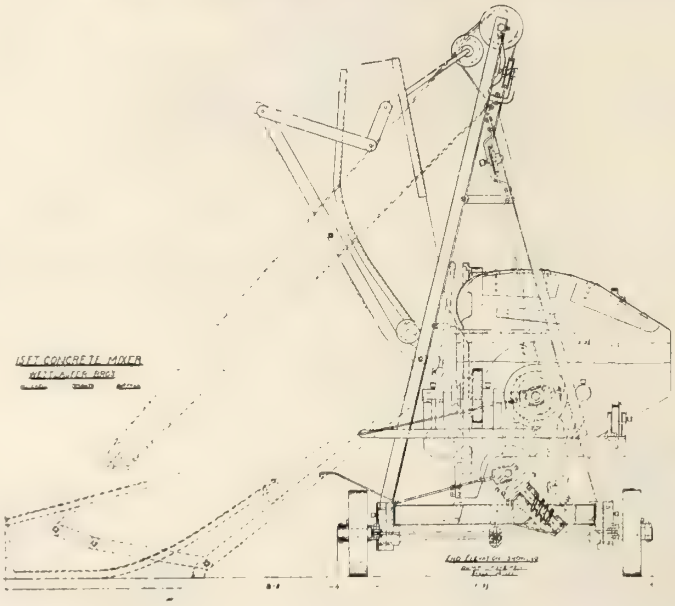
THE "HEARTSHAPE" DRUM



This new improved patent ' Heartshape" drum turns the batch end for end. It thus ENSURES a QUICK and POSITIVE mix.

This shape of drum makes an even distribution of the weight of the batch of concrete thereby lessening the strain on any particular point.

Every detail of the design and construction of this "Heartshape" drum makes for great strength and long life. The wide overlap in the seams as shown in the cut gives it 100% more strength and makes wearing-out almost an impossibility. TEST AFTER TEST HAS PROVED ITS EFFICIENCY.



This front elevation of our Nos. 5 & 6 Mixers show the automatic hopper ready to receive material, also discharging into the drum. Note compactness, simplicity and few parts.

The absence of all complicated working parts in the Wettlaufer "Heartshape" Mixer reduces the liability of a breakdown to a minimum, and renders it easy to control. THE ENTIRE MACHINE IS OPERATED BY ONE MAN.

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

Wettlaufer Bros.

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Hooton & Moore
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Rogers *Service* embraces emergency reserve stock adjacent to principal centres, *prompt* delivery etc., which contribute to *absolute satisfaction* of engineer, architect, contractor and owner alike. Specify Rogers Cement.

ROGERS' CEMENT

Mills are located at
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Kirkfield
Orangeville
Owen Sound
and Wiarton.

ALFRED ROGERS LIMITED

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1

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- Canadian Pipe Co.
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- Improved Equipment Co.
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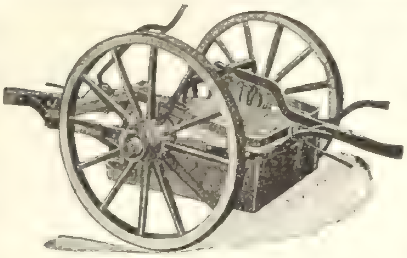

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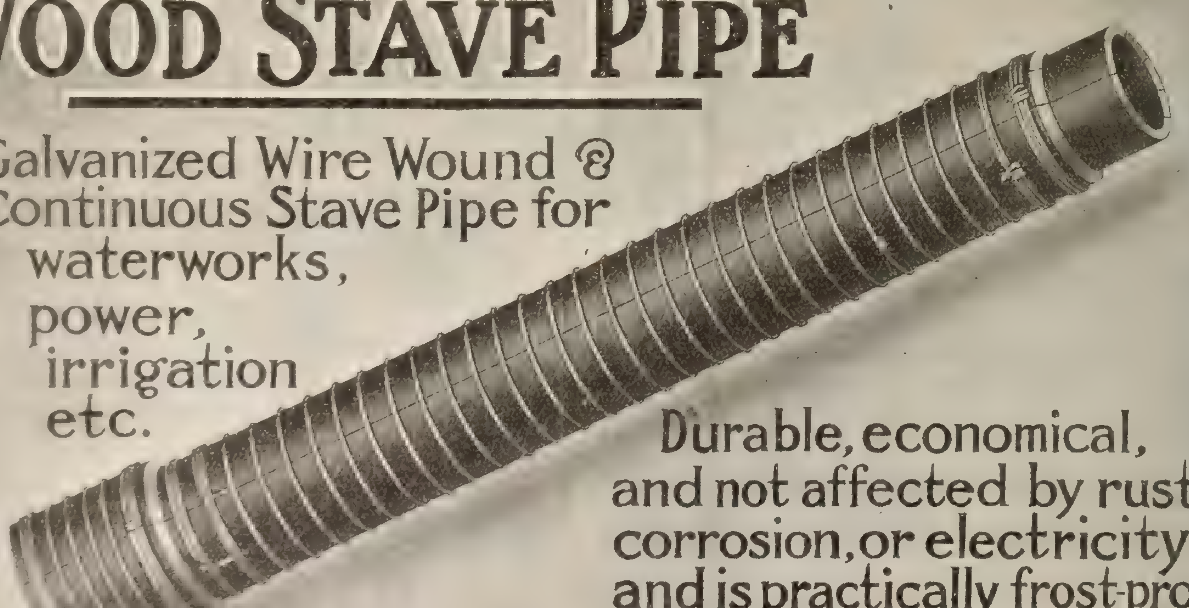

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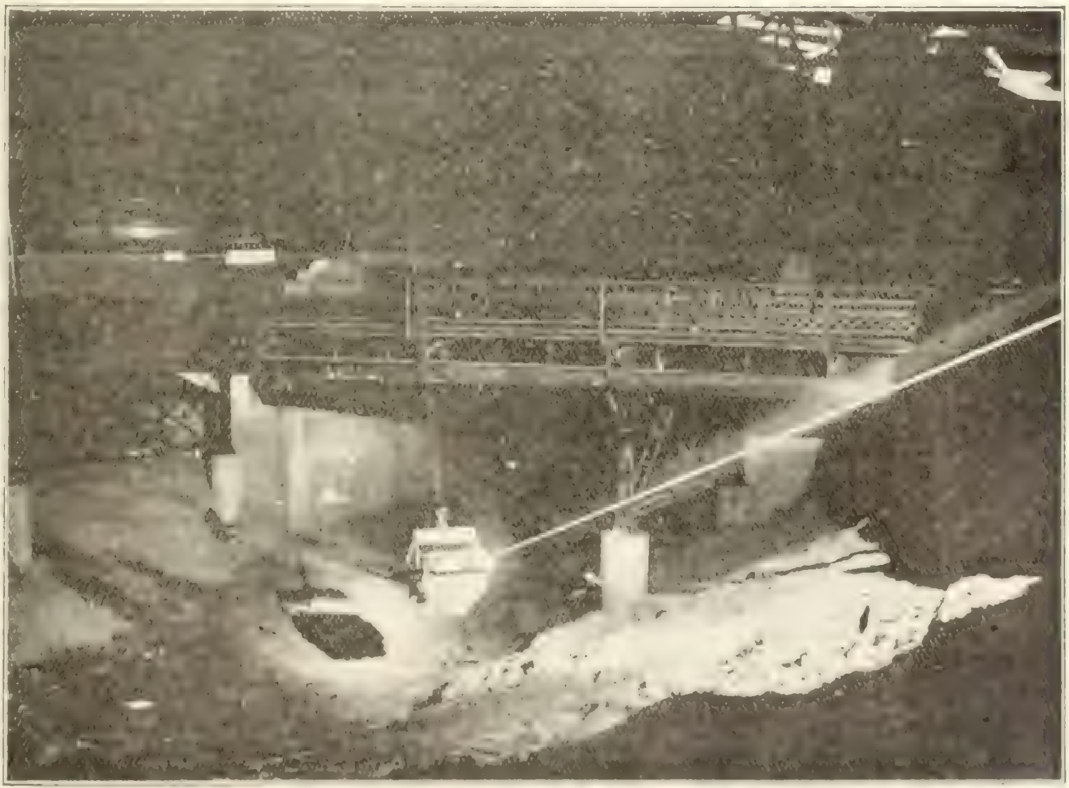

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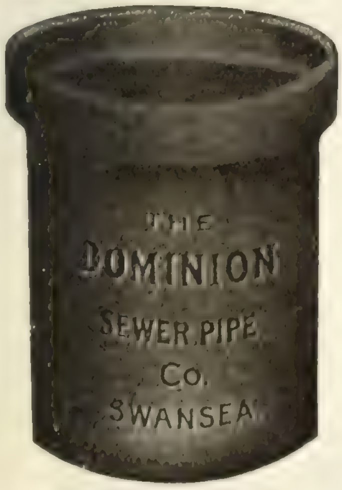

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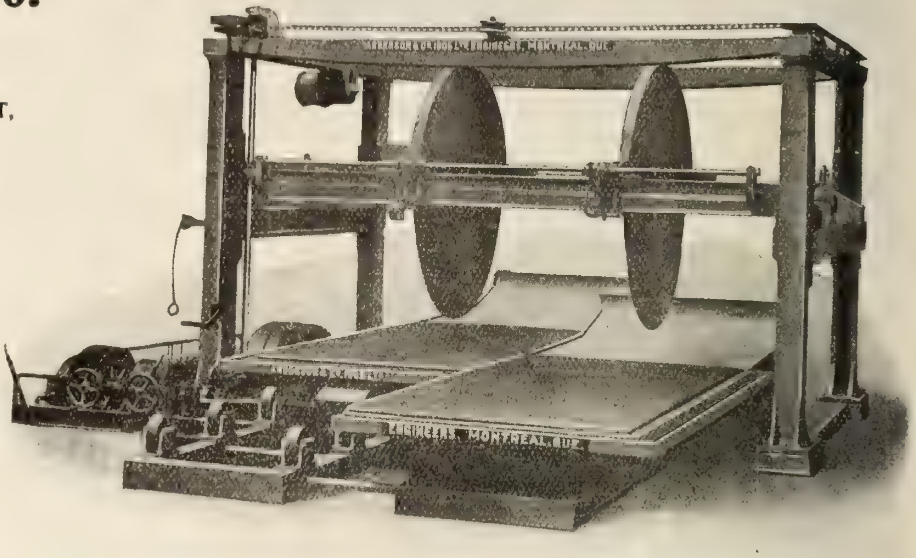

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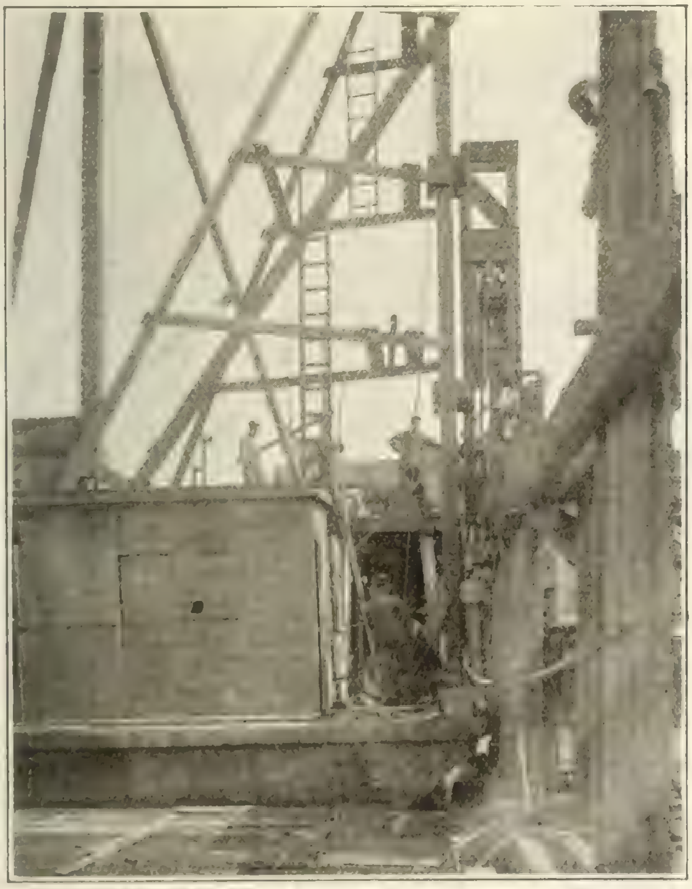

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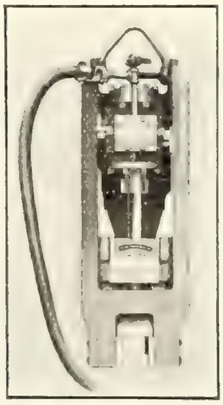

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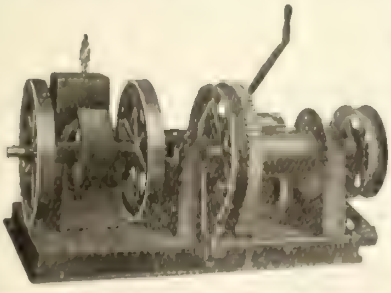

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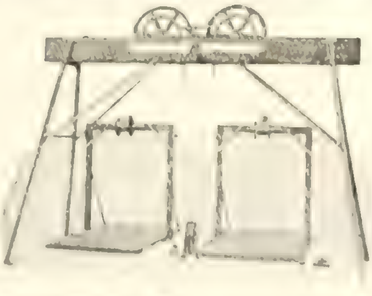

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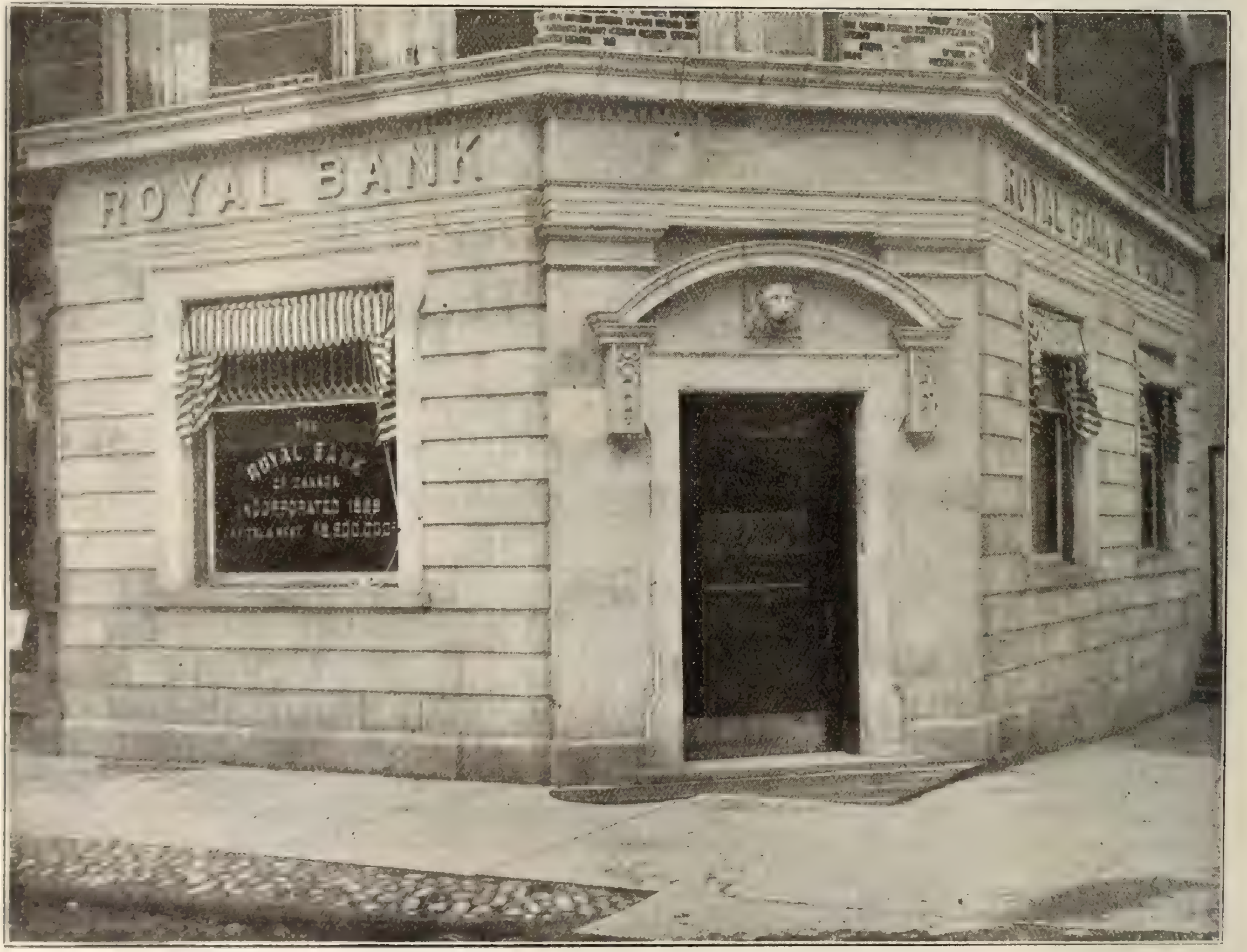

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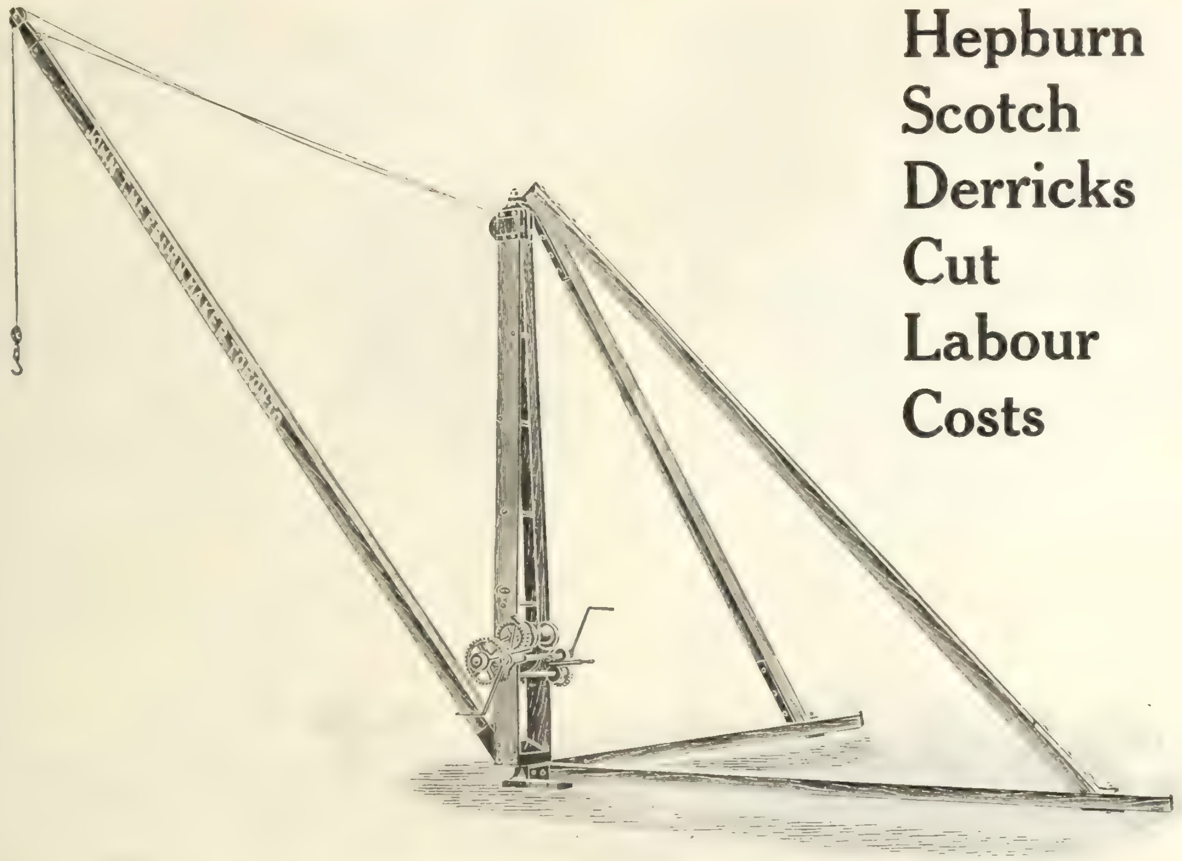

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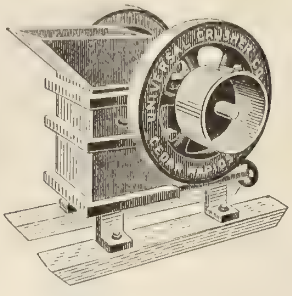

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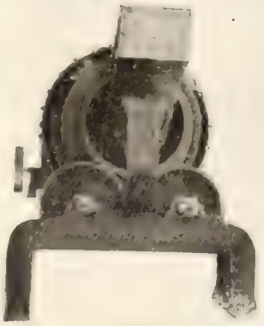

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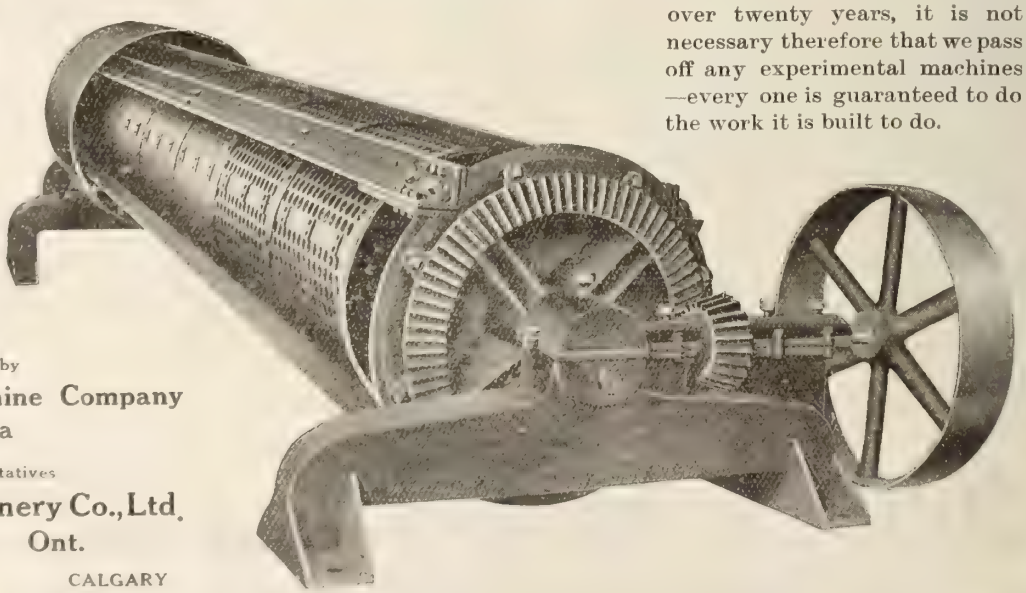

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Means Just This:

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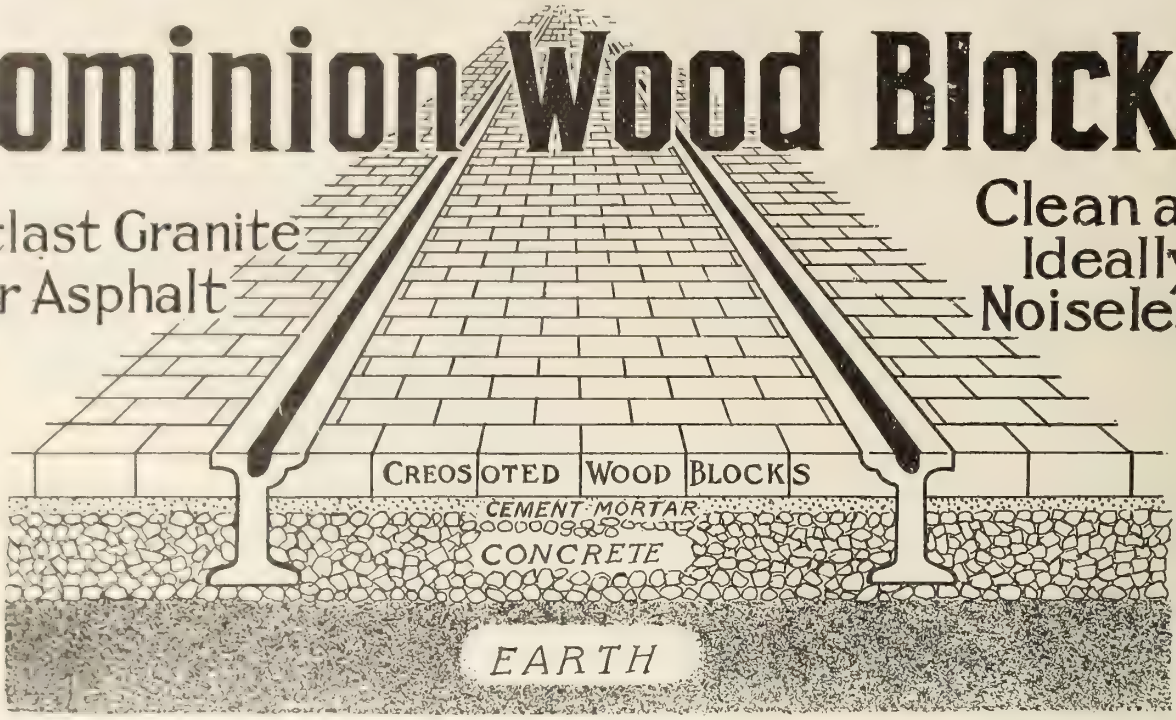

The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

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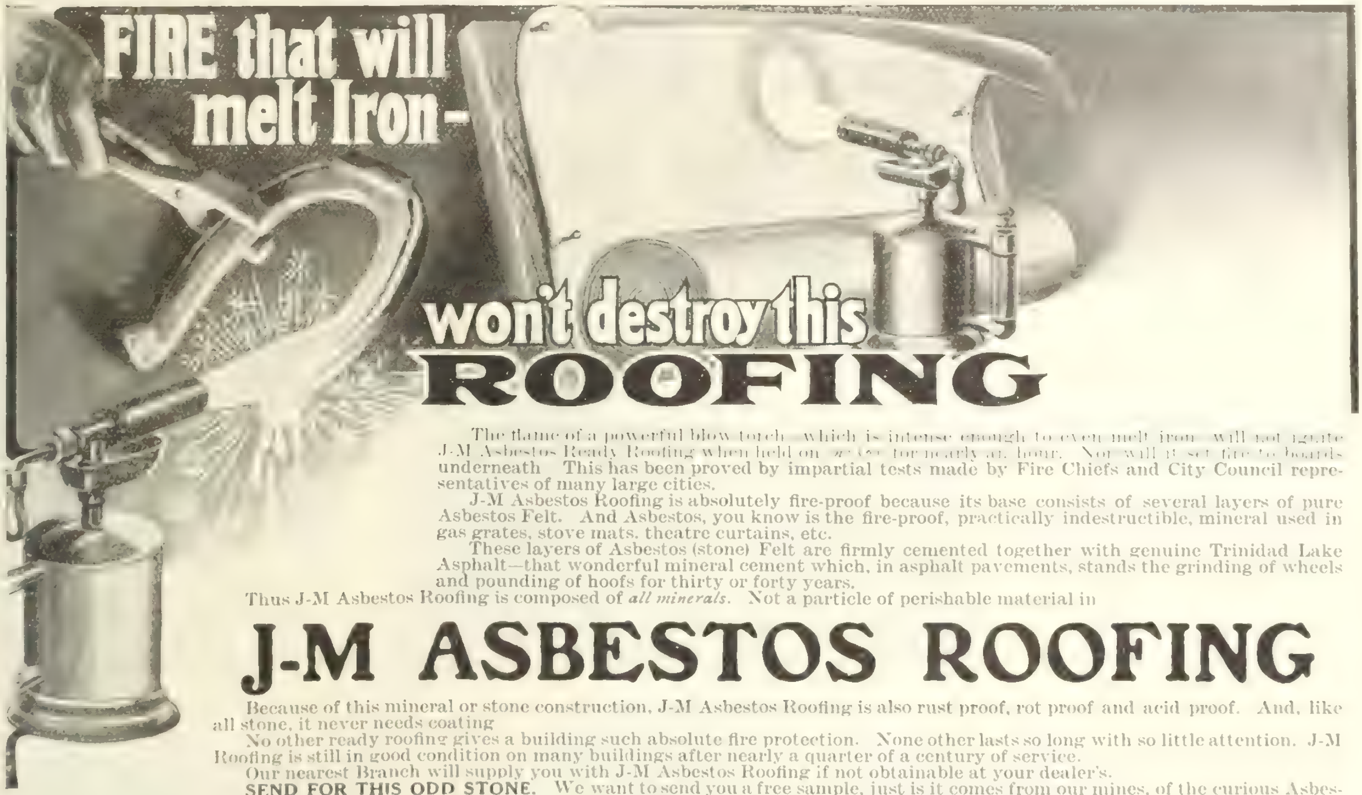

The flame of a powerful blow torch—which is intense enough to even melt iron—will not ignite J-M Asbestos Ready Roofing when held on [illegible] for nearly an hour. Nor will it set fire to boards underneath. This has been proved by impartial tests made by Fire Chiefs and City Council representatives of many large cities.

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Because of this mineral or stone construction, J-M Asbestos Roofing is also rust proof, rot proof and acid proof. And, like all stone, it never needs coating.

No other ready roofing gives a building such absolute fire protection. None other lasts so long with so little attention. J-M Roofing is still in good condition on many buildings after nearly a quarter of a century of service.

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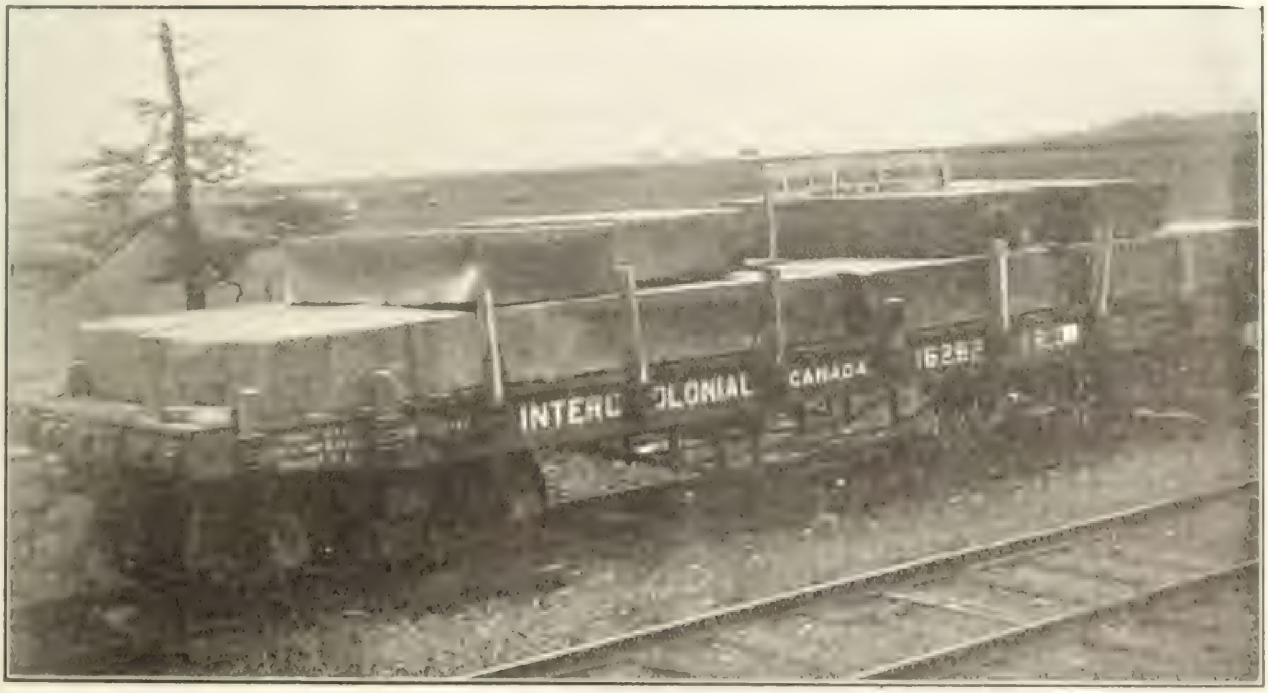

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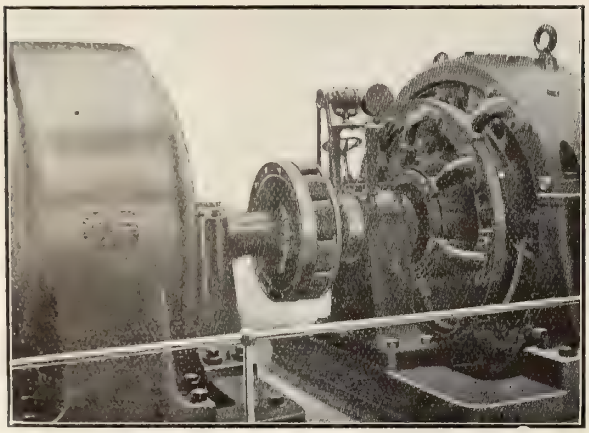

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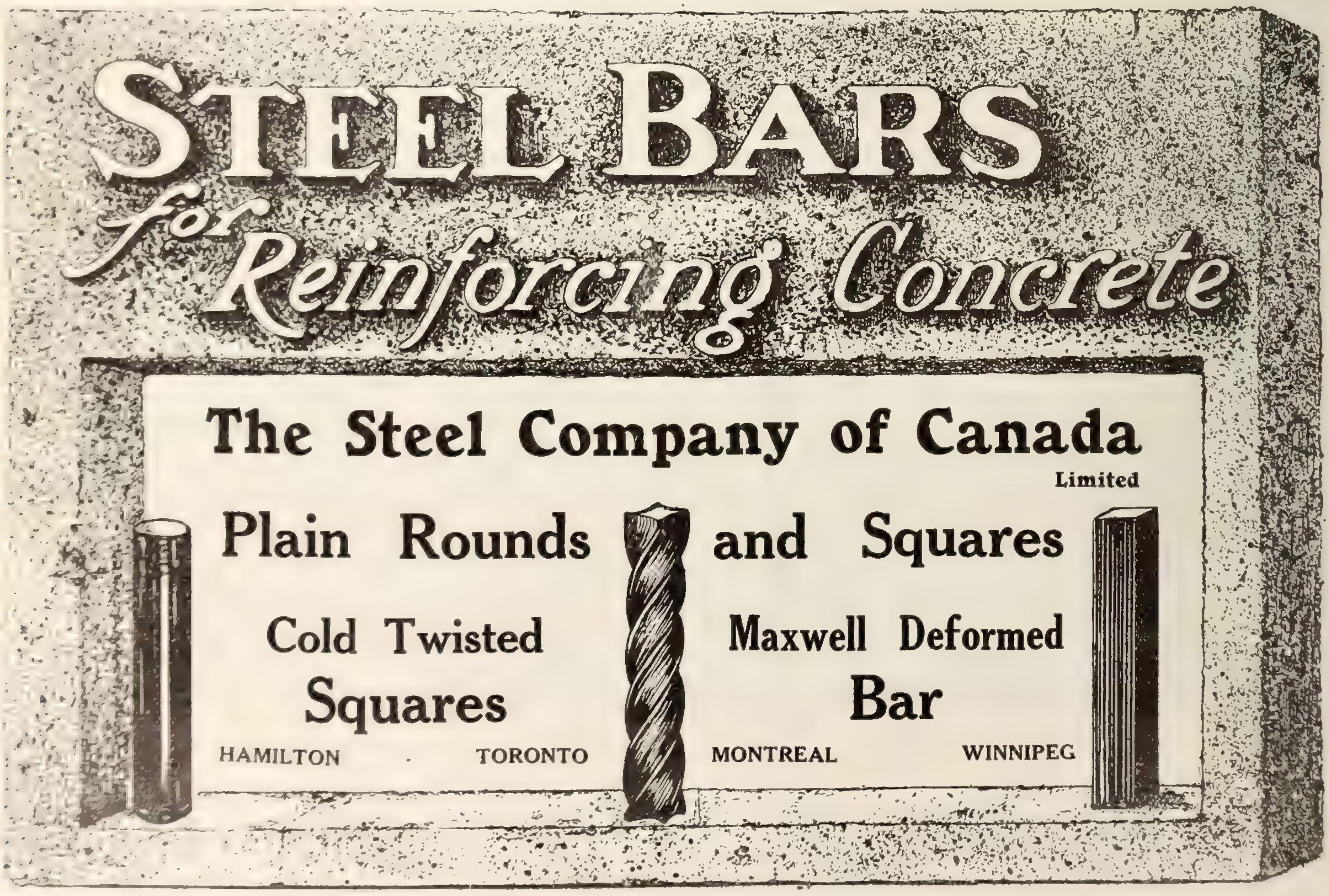

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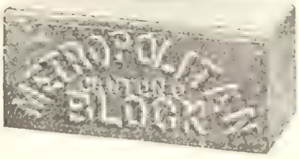

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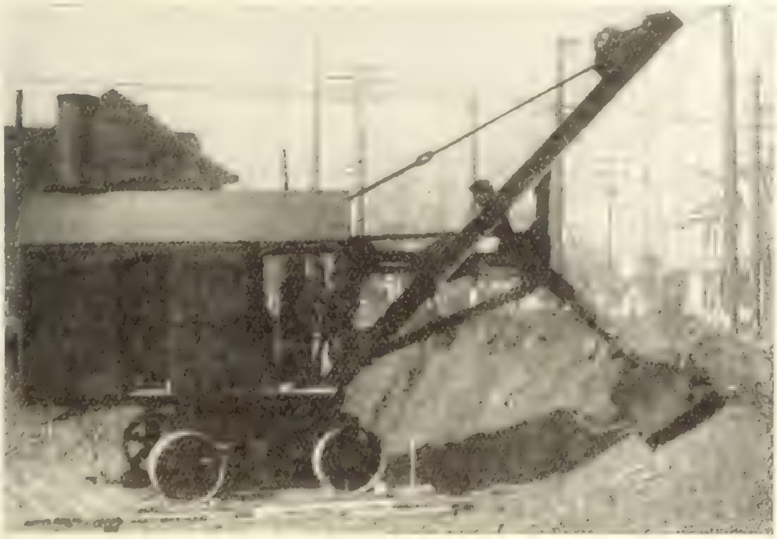

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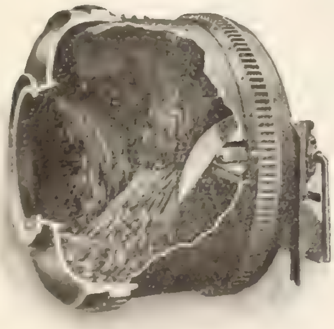

There's a Uniformity About Koehring Mixing No Other Mixer Equals

THERE ARE three continuous, independent opposed mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

And the important feature is that the actions being independent and opposed to one another there is an intermingling of the entire mass of material contained in the drum.

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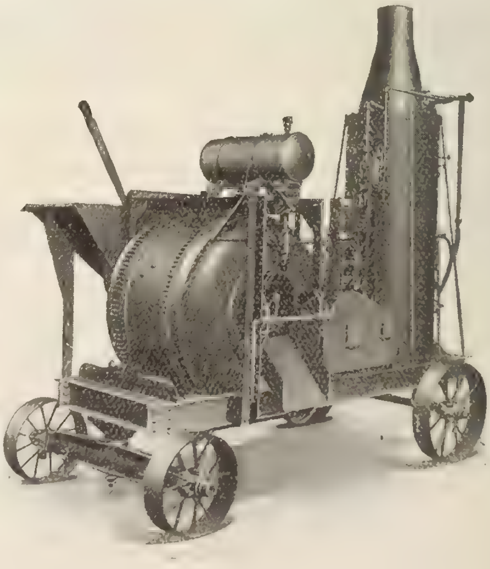

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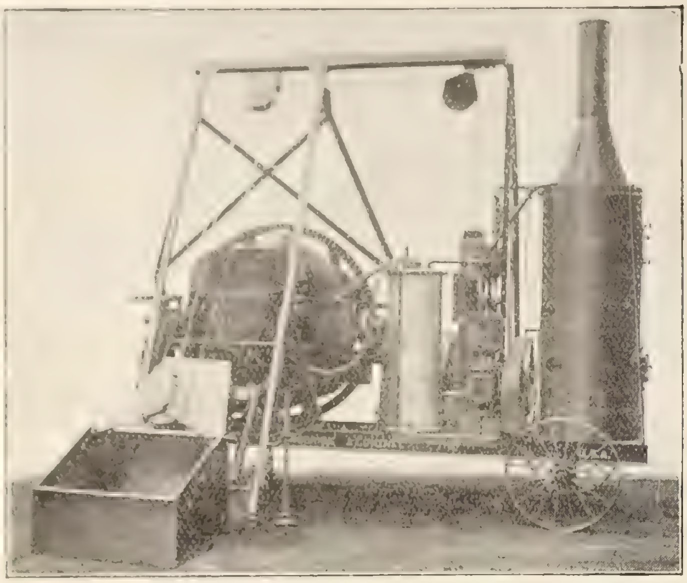
A Continuously Even and Regular Heat



The cube principle of mixing produces the most perfect concrete that can be mixed.

is secured by a Chicago Improved Cube mixer with Hot Mixing Attachment. An oil spray burner at whatever point it is "set" delivers just the same amount of oil and air from hour to hour so that the number of heat units generated is always the same. Since the Austin combustion chamber opens directly into the mixing drum and has no other opening for heat to escape an even amount of heat is delivered hour after hour into the drum. Bear in mind that the combustion chamber is a fixed part of the mixer drum and partakes of its every movement, therefore heat is supplied to the drum in every position—not merely when it is mixing to be shut off when it is tilting. No vagaries of firing the boiler or of steam pressure have to be watched. The heat supply is automatically even and continuous. **An even heat means an evenly heated mixture, batch after batch, which is a prime requisite in bituminous concrete paving.**

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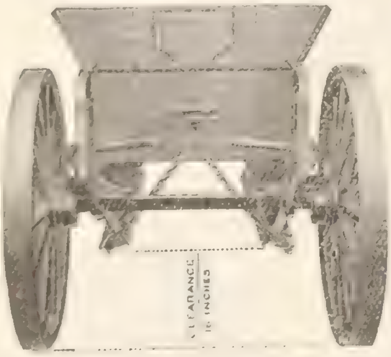
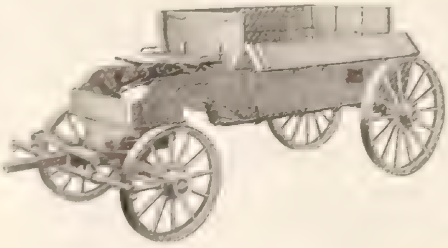


☛ Now look at the picture again. Can't you see why it is that a Watson always makes a quick and easy get-away from the dumped load? Of course you can! And yet if you'll take a yard stick and go hunting for any other dumping wagon with anywhere near as big clearance as the Watson, you won't find it. Try it and see.

The Watson has more users, by many thousands, than any other dumping wagon made.

How would some of the printed matter strike you? It gets right down to brass tacks—states nothing but the proven truth! and is mighty interesting reading.



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"The Belt That Clings"

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The Imperial has the cling of rubber and the endurance of many plies of hard-twist, long-fibre *cotton fabric*, rubberized, cured and vulcanized into one solid, enduring piece.

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The Imperial Belt is a power saver. It earns its cost by turning into increased production the power and the time lost by slippery leather belting. And it costs less.

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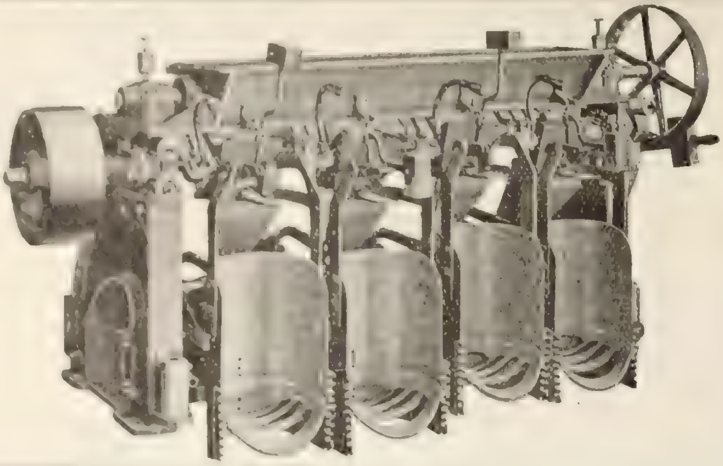

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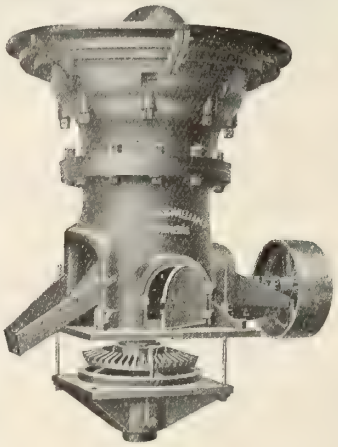

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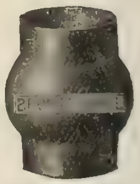

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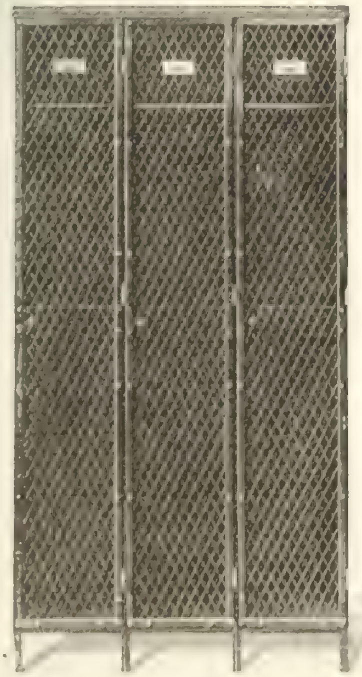

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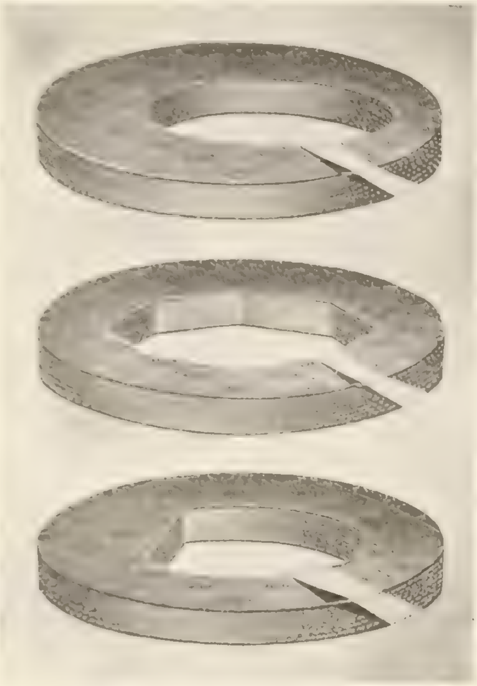

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Is Municipal Engineering on the Decline?

RECENT developments in municipal engineering circles in Canada cannot fail to lead members of the profession and those who are preparing to enter it to a consideration of whether or no the requirements for such posts are becoming so unreasonable as to debar the average man from competing for them. Certainly one cannot help thinking occasionally that the chances of success in this calling are all too slight and that distinction in the field is out of the question. In the older countries, perhaps, the municipal engineer does get one chance in about ten thousand of becoming eminent. Mention of such an one is made elsewhere in this issue. But in Canada the road is a more rugged one; there is less recognition; achievement is more commonplace, the work less alluring—if none the less honorable and useful.

During the past decade most of us have known bright, earnest men, apparently possessed of excellent qualifications, who have fallen down in municipal service and passed into obscurity with the main object before them of living down and disproving unjust aspersions upon their character and ability. Instances of this kind have been so common, and criticism has been handed out so lavishly, from both responsible and irresponsible quarters, that we make no apology for contributing our quota.

We cannot help thinking that much of the failure and disappointment may be attributed to the unreasonable demands made upon the engineer. Too wide a range of duties is usually assigned to him. In the very nature of things if a man is to be an expert in every branch of municipal engineering he will be jack-of-all trades and master of none, paradox though this may be. In the smaller places, while the work which devolves upon the city or town engineer is relatively simple, he often has to be both designing and constructing engineer, in addition to many subsidiary duties. Practically all construction work is carried out under his direction. After putting in some years at varied miscellaneous effort of this kind, some extraordinary problem, such as the designing of a new waterworks or sewerage system, will arise. The engineer is entrusted with the design and generally makes a satisfactory job of it, but once in a while some unforeseen conditions will crop up, a mistake occur, and then he may look around for his friends. We are strongly of opinion that in most of such cases the authorities should call in experienced engineers in private practice to design or advise in the design.

In the larger municipalities, especially, it is the wisest and the most satisfactory course to appeal constantly to engineers of broad and varied experience for the approval or revision of plans for outlining new works or policies. The duties of the city engineers of our large cities should be little but administrative. The city engineer should certainly be a man of as broad and varied knowledge and experience as the money at the disposal of the city will command, but so surely as an attempt is made to secure an all-round expert—whatever that may be—so surely will there be the appointment of the man who is jack-of-all-trades and master of none. The requirements of the city engineer should be limited to good practical experience in the main branches of his profession, a successful record, and some promise of breadth of judgment in dealing with questions of public policy. In other fields, and in private enterprise, a man possessing such qualifications would attain something of name and fame, and perhaps a fair share of material prosperity. The remuneration, then, should be in conformity with the requirements.

The unreasonable things expected of the city engineer proceed in the majority of cases from ignorance and from the fact that many of the men elected to our governing bodies are themselves totally unfitted to assume the responsibilities of the city. Whether an improvement in this state of affairs will be effected by radical changes in our system of government or whether it will come about through the process of evolution, it is hard to foretell. But certain it is that so long as the present unreasonable requirements are made of the engineer and so long as ignorant men are elected to direct public affairs, just so long will municipal engineering as a profession show its present tendency to decline.

Professional Status of the Engineer

ENGINEERING as a profession was discussed recently by Mr. George Hughes in his presidential address before the Manchester Association of Engineers. The address was an unusually strong presentation of the high mental and moral qualifications necessary for truly successful technical achievements, and was one of the strongest arguments for the recognition of engineering as a profession that has been made in a long time, says The Engineering News. This argument is based on the character of the work done by an engineer responsible for undertakings of any magnitude, which demand not only sound knowledge of several branches of science, but also skill in its useful application to these undertakings. If this is the real meaning of a profession, as it is the dictionary definition, there can be no question that Mr. Hughes is right in claiming that engineering is a profession. There is a question, however, whether such a definition fully states the general public opinion regarding professional work in America. There is an undoubted belief here that a professional man is one engaged in independent practice, and the engineer, lawyer or physician who works on a salary is not engaged professionally, but as an employee. This belief is repeatedly shown in the weight attached to utterances of many eminent mechanical and electrical engineers. Nobody doubts their attainments, but it is noteworthy that when they discuss many subjects there is a general feeling that they are not arguing from the complete fulness of their knowledge, as professional men, but from such parts of their knowledge as best serve the interests of the companies on whose salary lists their names appear. This feeling is so strong, indeed, that the American Society for Testing Materials expressly recognizes it and practically invites the engineering specialists of manufacturing companies to argue their employers' side in debates with the engineers of purchasers concerning the vitally important subject of requirements for materials and methods of testing to determine the fulfilment of such requirements. All this discussion regarding the professional status of the engineer is, however, merely a sort of family dispute, insignificant in view of the fact that, whether the engineer follows a profession or a calling, the study, experience and ability required for success are widely recognized as at least equal to those necessary for success in medicine and the law.

Professional Arbitrators

ONE clause put into many, if not most, specifications has proved of extraordinary trouble, complains a writer in an English contemporary. It makes the engineer sole arbiter, and there are times and there are engineers when and under whom such a clause is bad. We all know the class of engineer, and we all know the circumstances when such a clause leads to a miserable miscarriage of justice. There is much to be said for the clause, but to be really practical it needs wait for the millennium. What happens now is frequently complained of by a section of our readers. The contractor signs in trepidation, and trusts to luck. He knows there is no equity, but he cannot afford to let chances go by, and takes the risk. That risk sometimes proves a great loss—nay, in some cases complete ruin. No one wants to bring about drastic changes under ordinary circumstances, but many do want to see a change in this clause that would lead to a more equable method of settling disputes. The following question might well be considered. The clause should not be absolute, but admit an arbitrator. There is some need for professional arbitrators, because nominees of presidents of this or that association are not always capable of understanding evidence. Thus what we want is more a professional arbitrator than a casual one—a gentleman who is at once master of the engineering and of the contracting work, and capable of weighing evidence. Surely there is no unsurmountable obstacle!

On another page there will be found a biographical sketch of Sir Maurice Fitzmaurice, C.M.G., Chief Engineer to the London, Eng., County Council, upon whom the honor of knighthood has just been conferred. The name of Sir Maurice Fitzmaurice is well known in Canada and the heartiest congratulations will be extended to the new knight from this side of the Atlantic.

An Unsatisfactory Architectural Competition

The following circular has been issued to architectural societies and individual architects by Mr. Richard T. Perry, Hon. Secretary-Treasurer of the Royal Architectural Institute of Canada:—

Members of the British Columbia Society of Architects and other practising architects are requested by the council to refrain from competing for the proposed University Building at Point Grey (Vancouver) until the conditions of competition are revised, for the following reasons:

1. No independent assessor or assessors.
2. First prize merged in commission.
3. No time limit to professional residence and practice.
4. Nothing definite re buildings to be immediately erected.

The council have communicated with the Minister of Education on these points, and intending competitors are requested to wait for a satisfactory reply, which will be advertised as soon as received.

A Noteworthy Resolution

Concerning the appointment of a United States construction engineer at Burnaby, B.C., to which editorial reference was made in the Contract Record of March 13, the following resolution has been presented to the council of Burnaby by the Central Ratepayers' Association:

"That this meeting of delegates from all the ratepayers' associations of Burnaby, having had before them a statement concerning the selection by the board of works of a construction engineer with a view to recommending a suitable person to the council for appointment, is of the opinion:

"First, that an advertisement asking for applications should have been asked for in the first place; second, that the selection of a citizen of the United States was not only illegal but an acknowledgement that the Society of Civil Engineers was not able to produce a man capable of fulfilling the duties of the office; third, that the resolution, when the proposed appointment was contested to advertise for applications, should have allowed sufficient time for applications to be tendered, scrutinized by the committee and a selection made after an interview.

"They are further strongly of the opinion that it is not necessary to go beyond the limits of the British Empire for a construction engineer. That such officer would be subordinate in position and salary to the engineer himself.

"That all future vacancies and new appointments be advertised and a clause be inserted in the advertisement: 'That canvassing by or on behalf of any candidate shall disqualify any such candidate for the appointment.' "

The cutting and wearing power of a stream of blown sand, long since utilized for various purposes, has been employed for testing building materials at the Gross-Lichterfelde Institute in Germany. Granite, pine wood, linoleum and other substances used in the construction and furnishing of buildings are subjected for about two minutes to the action of a blast of fine quartz sand, under a pressure of two atmospheres. The results show the resisting powers of the substances tested to the effects of wear. This form of test is applicable to road building materials.

Rural Water Supply at Coldstream, B.C.

Gravity System Serving an Area of Nearly Thirty Square Miles —Designed to Provide for a Population of Three Thousand

By Jas. C. Kennedy, Mem. Can. Soc. C. E., Vancouver

THE municipality of Coldstream lies at the head of the Okanagan Valley and may be said to constitute the Coldstream Creek Valley, in the interior of British Columbia. Alongside of Okanagan Lake lies Long Lake, the elevation of which is 1,300 feet above sea level, and into the northern end of Long Lake empties Coldstream Creek. The main source of Coldstream Creek is Nelson Creek, flowing in from the north. Deer Creek did flow in from the south and was also a tributary, but of late years it has been largely diverted for irrigating purposes.

Coldstream Creek flows in a westerly direction from a divide, or saddle, eight or nine miles eastward of Long Lake. Nelson Creek flows down its own valley from the mountains until Coldstream Valley is reached. Here the flow takes a right angle turn to westward and becomes Coldstream Creek. The municipality is located between two mountain ranges and extends easterly from the head of Long Lake a distance of about 10 miles and has an average width of about three miles. In the centre of Coldstream Valley is located the celebrated Coldstream Estate.

The entire Coldstream Valley, and larger districts outside, are watered by the White Valley Irrigation & Power Company's extensive irrigation works, which now comprise over thirty miles of Main Canal and which are being projected yet further. The source of the irrigation supply is Lake Aberdeen, situated on a mountain standing south of Coldstream Valley.

Notwithstanding the comprehensive system of irrigation, the citizens of the municipality, with a growing population, felt the need of a good and sufficient domestic water supply, and in 1910 the people numbering only 500 all told, set themselves diligently to the task of ascertaining the most suitable source and the probable cost of a general system that would serve the residents scattered over an area of nearly thirty square miles. The first negotiations to this end took place in June or July of that year and in the month of November following, the engineer had been engaged, a preliminary report and estimate of cost had been furnished, and a $100,000 by-law was voted upon and passed, authorizing the construction of a gravitation system according to the engineer's recommendation. During the following winter, plans and specifications were prepared and construction work was begun in the early spring of 1911.

The plan was to tap Nelson Creek at a point about one mile upstream from the White Valley Road, or in other words, one mile above where Nelson Creek changes its course and becomes Coldstream Creek; to convey the water thence by pipe line to White Valley Road, and follow the road westward, down the centre of Coldstream Valley for a distance of 5¼ miles to a point where the road forks. At that point the pipe line was also divided into two branches and made to assume somewhat of a distribution system.

The orginal scheme contemplated the laying of somewhat over 19 miles of pipe lines for immediate use, but by subsequent decision of the municipal council, the engineer was requested to extend the scheme to include provision for certain outlying districts adjacent to Long Lake, but beyond the westerly bounds of the scheme first proposed.

The elevations of the lands to be served varied all the way from about 1,900 feet above sea level at the upper, or Lavington, end of the works, down to about 1,300 feet at the lower, or Long Lake, end. The natural slope of the ground along the chosen highways is fairly gradual until nearing the lake shore where some of the areas served lie only 10 or 20 feet above lake level, whilst others, quite near, rise about 500 feet higher. The figures quoted have reference to pipe line elevations and do not denote the highest elevations of lands nearby, some of which are beyond the intended scope of the water system.

With such wide variations in the elevation of the districts to be served—about 600 feet—arose the problem: how are the pressures to be regulated?

The natural topography of the municipality lent itself to the solution. Advantage was taken to extend short laterals from the main pipe line, to reach small reservoirs proposed for water storage, at suitable locations on the hill sides and for providing means to step down the increasing pressures at the same time.

Intake Works and Reservoirs

The intake works were fixed at 1935.00 elevation, and the first or No. 1 reservoir, about 4 miles distant, was fixed at 1850.00, or say 87 feet lower elevation. This reservoir was provided with an overflow pipe for use in case of emergency, also with a float valve to automatically close and stop the inflow as the reservoir should fill, and to re-open as the water should lower. The reservoir was likewise provided with an outflow pipe doubling back to the main, but separate from the parallel feed pipe, except through the medium of the Reservoir. The outflow pipe was thus the feeder of the main, extending beyond the reservoil, or further down the valley, with the pressure head reduced 87 feet.

The proposed line of main at two miles westward of Reservoir No. 1 passed conveniently close to another suitable resenvoir site on the opposite side of the valley. This site was chosen for Reservoir No. 2, at 1653.00 elevation. A short loop pipe connection between the main and the reservoir was adopted precisely as at Reservoir No. 1, the step-down in pressure head at No. 2 being another 197 feet.

No. 2 Reservoir is located practically at the branching point of the main, into two pipe-lines previously mentioned, and the necessary connections are arranged for feeding both branches, or only one, as circumstances may require, the change being effected quickly by opening or closing gate valves installed for the purpose.

No. 3 Reservoir site is situated again across the valley on a hill slope, near the extreme westerly limit of the present distribution system. The step-down in pressure here is to 1643.00 elevation, or to only 10 feet less than that at No. 2. This elevation suffices to supply the highest services of the lake shore vicinity, but would create higher pressures than desirable for the low land services. To obviate trouble from that source, two pressure-reducing valves were inserted at points on the pipe circuit. These pressure-reducing valves had to be planned or placed to fulfil their functions and yet permit of a direct flow and intercourse, through at least one line of pipe, between Reservoirs No. 2 and 3. Thus by introduction of the pressure-reducing valves, the lowest stretches of the distribution were protected against a higher pressure than that due to water standing at at 1500.00 elevation, which is, say, 150 feet less than would be imposed in case direct pressure from Reservoirs 2 and 3 were permitted.

At a convenient point on the pipe line between the two pressure-reducing valves, a relief valve is introduced to prevent any excess of pressure, should temporary failure of action occur on the part of one or both pressure-reducing valves. The pipe lines are provided with air valves to automatically free the pipes of air at the various summits in the system, and are likewise well provided with blow-offs at the low points.

For the most part, the water pressure is ample for fire hydrants, but owing to the buildings being widely scattered throughout the municipality, fire hydrants have been connected only at one point in the system, that is, at Coldstream Ranch.

The main pipe is 6-inch diameter from the intake to Reservoir No. 2 and the balance is 4-inch. All the mains are of the wood stave, wire wound type with coupling joints, and were manufactured in the province.

With the exception of a few thousand feet of the 4-inch pipe, which was laid by untrained laborers as a rush job about the close of the season's work, the entire pipe system proved to be remarkably free from leaks when the water was turned on for use, and the leaks that did occur were of minor importance.

The quantity of 6-inch pipe laid is eight miles and of 4-inch, eleven miles. Another six miles is to be laid this season.

Reservoirs—These, as already stated, are three in number. They are of reinforced concrete construction with rafter and shingle roof covering, sealed on the inside with matched lumber. The reservoirs are circular, 30 feet inside diameter and 12½ feet deep. The bottom is flat, 15 inches thick and projects 6 inches beyond the outer diameter of the walls. The capacity of each reservoir is 50,000 gallons. Numbers 1 and 3 are founded on gravelly hardpan foundations and No. 2 on solid rock.

The peculiar feature of the whole scheme is that it is designed solely for serving a rural district where parallel pipe lines and circuits are necessarily few, and where several comparatively small reservoirs with their arrangement for stepping-down the water pressures, are better adapted to the pipe line conditions than one large reservoir would be. Further, the contour of the district is such that similar small reservoirs can be conveniently added to meet the increase of population and of water consumption, or for extensions of the distribution system.

The concrete in the reservoirs was carefully built, to obtain solidity and imperviousness and upon completion the interior of the walls and bottom received two or three coats of neat cement wash, applied with a brush. The result has been a gratifying total absence of leakage, with the water standing at full height.

In the case of No. 2 Reservoir, where there is special exposure to the sweeping cold winds of winter, the studding, utilized for support of the outer concrete forms, was allowed to remain in place and was sheathed on the outside with shiplap. Thus, with a 6-inch air space formed outside of the concrete wall, greater protection s obtained against the extremes of cold in winter and heat in summer.

The other two reservoirs are nestled closely into the hillsides and the indications up to date are that no trouble need be anticipated from frost penetration, although occasionally the thermometer ranges 25 or 30 degrees below zero.

Intake and Collecting Basin—Like other mountain streams, Nelson Creek is subject to considerable fluctuations of flow, and at times carries more or less in the way of leaves and rubbish accumulated in its forest course.

At a turn in the creek, a small canal or ditch was dug to divert as much water as might be needful for the waterworks supply. The ditch was carried about 150 feet to one side and to a filtering basin. The basin is a circular structure of 15 ft. inner diameter, sunk 6 or 7 feet below ground level. The wall stands a couple of feet or more above natural ground surface. Outside of this wall is built another circular wall, the two forming an annular space, 3 feet wide. The space is filled with gravel, graduated from coarse stones at the bottom to a fine grade toward the top, finally covered with a layer of clean sand, the top of which is slightly below elevation of the ditch, which delivers its run of water on to the filter bed thus formed. Holes through the inner wall at its bottom level permit the filtered water to issue into the inner chamber or basin and from the latter water is drawn off by the supply main to the distribution system.

The filter basin is covered with a circular house of wood construction, sufficient in height to give easy access for cleaning off or renewing the filtering material.

The inlet to the canal is provided with a screen to prevent, as far as practicable, the entrance of leaves and other floating rubbish.

The available flow of the creek in dry season and the system with its possibilities of easy extension and enlargement are calculated to serve a population up to 3,000.

The council of the municipality adopted the engineer's recommendation to install a meter on every service and to sell only by meter, from the outset.*

Vancouver Waterworks System

An interesting description of the new waterworks system at Vancouver, B. C., prepared by the Engineer, Mr. H. M. Burwell, was published in our issue of December 28, 1910. We are indebted to Mr. Burwell for the following particulars concerning the installation of the new supply main from Seymour Creek:

"The contract was let to The MacDonald, Godson Company, Limited, Vancouver, on May 31st, 1911, for supplying 40,000 ft. of steel-rivetted pipe, 36 inches in diameter; 20,000 feet of steel-rivetted pipe, 32 inches in diameter, and 6,500 feet of lap welded pipe, 18 inches in diameter. The 36-in. pipe is built of plate ranging from 5/16 in. in thickness to ⅜ in., and cost $4.00 and $4.96 per foot. The 32-in. pipe is built of 5/16 inch plate and the price paid for this pipe is $3.58 per foot, all delivered at Vancouver, duty, freight and all other charges paid. The contract was also let on the same date to Messrs. Balfour, Guthrie & Company, of Vancouver, for supplying 4,000 feet of 18-inch cast iron flexible pipes at $35 per ton. On December 30th, 1911, the contract was let to Messrs. Balfour, Guthrie & Company, for supplying 24,000 feet of 24-inch lap welded steel pipes built of ¼ inch and 5/16 inch plate at $2.67 and $3.15 per foot, and Messrs. A. J. Forsyth & Company, Vancouver, secured the contract for supplying all the gate valves for this new main at a total of $8,687. The trench for the 36-inch main was given to the Burrard Engineering Company, of Vancouver, at $1.04 per lineal foot, which includes the bell-holes and back-filling.

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* Paper read before the Vancouver Branch of the Canadian Society of Civil Engineers, Mar. 4, 1912.

"The 36-inch pipe referred to will be a continuous steel rivetted pipe extending alongside the present Seymour Creek supply main from the Second Narrows of Burrard Inlet to the temporary intake located about 2,000 feet up stream from the present one. It is designed with a sufficient strength to withstand the pressure to which it will be subjected when the permanent intake at the water fall on Seymour Creek is finally installed. This intake, which is located on a reef of granite bedrock is distant about four miles up-stream from the present one and has an elevation of 660 feet above sea level. It will give a gravity water supply for all the highest levels of Greater Vancouver and the adjoining municipalities.

"By the construction of a dam 40 feet high on top of this water fall a storage covering about 500 acres will be created. This will be ample for all of Vancouver's requirements for many years to come.

"The temporary intake is designed to suit the peculiar conditions which exist on this stream. There is no diverting dam and the water enters the intake at the side of the Creek at right-angles to the direction of the current. Years of experience on these mountain streams have proven this arrangement to be the only satisfactory one so far discovered.

"The sediment tanks below the intake are designed to separate the sediment which enters the intake during floods. These streams carry down large quantities of sand and silt during about four or five days in each year (usually in the month of November), but for the rest of the year they are beautifully clear water creeks.

"At the north shore of the 2nd Narrows there will be placed three cast iron Wye pipes by which the 36-inch steel pipe will be connected with the four 18-in. shore connections of the flexible cast iron submerged mains which will cross the 2nd Narrows. The new line located for these submerged mains is about 400 feet easterly from the old location and the crossing under the Canadian Pacific Railway track which passes along the southerly shore of the Narrows is made by two small tunnels. Provision is being made for supplying the adjoining municipality of Burnaby with water, through an 18-inch pipe. From this point the new 32-inch main will convey the water into the city to a point probably at the corner of Clark Drive and Parker Street, where a cast iron Wye pipe will be placed. The 24-inch lap welded pipe mentioned will extend from this Wye pipe to the Little Mountain Reservoir, following along Clark Drive, 25th Avenue and Bridge Street, and another branch will extend northerly and connect with the city distribution system through a pressure-regulating valve which will maintain an uniform pressure, on the low pressure side, of about 110 lbs. per square inch. This new supply main above described is now being constructed and we hope will be finished this year.

"The whole work will be done by contract, except some rock work and a short tunnel 650 feet long at the Seymour Creek Canyon, also the pipe trench through the city streets.

"The capacity of this main delivering water into the central part of the city and maintaining a pressure of 110 lbs., will be about 12,000,000 Imperial gallons a day, which, added to the capacity of our present Capilano and Seymour Creek mains, gives us a total of about 30,000,000 gallons a day.

"The accompanying details of pipe tenders may be of interest to some of your readers as showing the keen competition in this business at Vancouver. I may state that in preparing specifications for these steel pipes I have always made it a point to permit a bidder to tender on any type of steel pipe. As a result of this policy we are to-day purchasing steel pipes at prices 20 per cent. less than the city paid for them six years ago."

G. T. R. Bridge Renewal, Lacolle, Que.

The Grand Trunk Railway have under construction the renewal of the bridge over the Richelieu River, near Lacolle, P.Q. This is a single track line, formerly the Canadian Atlantic Railway, acquired a few years ago by the Grand Trunk. The renewal of the bridge forms a part of the general improvement of this line, and when completed brings the section up to the heaviest loading capacity, made necessary by the increasing business from Swanton Junction.

The crossing consisted of a 186 ft. 10 in. equal arm draw span, with pile bent approaches, making a total length of structure of some 1050 feet. The old pivot pier supporting draw span consisted of an octagonal concrete monolith supported on timber platform and piles, encased in a rectangular timber crib and filled with stones. The rest piers were similarly constructed. The new work under construction will consist of a 250 equal arm draw span and 12 deck plate girders all supported on new concrete piers and abutments. The track will be raised 3½ feet to accommodate the new superstructure. The John S. Metcalf Company Limited, of Montreal, are the contractors of the substructure, while the Dominion Bridge Company, Ltd., of Montreal, are the contractors for the fabrication and erection of the new steelwork. The new work is under the supervision of Mr. H. R. Safford, Chief Engineer, of the Grand Trunk Railway Company.

Difficult tunnelling was encountered in tunnel No. 3 of the Little Lake Division of the Los Angeles aqueduct. The trouble was caused chiefly by the presence of large quantities of carbon dioxide gas, which was so strong and persistent that rats were suffocated in the tunnel 3500 ft. from the point of issue of the gas. Even with the use of two large blowers it was impossible to obtain sufficient ventilation, so it was decided to try to shut out the gas by lining. Concrete lining was put in for a distance of 150 ft. on either side of the gas-producing area, as well as in the immediate vicinity, but this failed to confine the gas, which forced itself out between the concrete and the rough, rocky sides of the tunnel. Finally a trench was excavated completely around and outside the lining in the rock; a large suction blower was inserted in this trench to draw the gas out, while another blower forced fresh air into the heading.

Comparative Merits of Vitrified Salt Glazed Sewer Pipe and Concrete Sewer Pipe*

Kansas City, Mo., Mar. 27, 1912

Editor Contract Record and Engineering Review:

We are sending you herewith a report of the Public Improvement Committee of Kansas City delivered March 25th, upon an ordinance requiring the use of concrete sewer pipe. Their findings were arrived at after a very commendable and impartial investigation extending over about four months, during which many leading sanitarians, testing engineers and university experts testified before them either in person or by letter. Since, therefore, their decision is a strictly engineering one, we presume it will be interesting to you and your readers.

Yours truly,
The Clay Products Publicity Bureau,
G. H. Tefft,
Secretary-Treasurer.

(Extract)

To the Honorable Upper House of the Common Council of Kansas City, Mo.

Gentlemen:

On Nov. 3, 1911, your Public Improvement Committee convened for the purpose of investigating the merits of the proposition of using cement or concrete pipe in the sewers of Kansas City. Your Committee invited the Board of Public Works to sit with them in the hearing, and also notified various parties interested in this matter. The manufacturers of cement sewer pipe and the various cement companies located in Kansas City, as well as the manufacturers of vitrified clay pipe, were present, and represented by counsel. Investigation covered a period of weeks, and more than 2,000 pages of testimony were taken, and the fullest opportunity was afforded all to be heard. Witnesses were brought by all the parties interested, from various parts of the United States, and the hearing was most thorough, complete and comprehensive. Practically all the leading sanitary engineers of Kansas City appeared before the Committee in person or by communication. Many of the leading sanitary engineers throughout the United States were also heard from either in person or by communication. Chemists, bacteriologists and ceramic experts appeared in person before the Committee. Master plumbers of Kansas City and contractors were also heard from.

Reports and investigations made in other cities where cement had been used were presented. Tests made in laboratories, in connection with vitrified clay and cement and concrete pipe, were also presented. One of the leading sanitary engineers and bacteriologists of the country, Mr. George W. Fuller, of New York, appeared in person before the Committee and advised the use of vitrified salt glazed pipe, even if the cost of same should be as much as ten per cent. or more of the full contract price of the entire job, over cement pipe. The former city engineer, Mr. Jas. L. Darnell, personally appeared before the committee, and recommended that vitrified salt glazed pipe could be had in the market, and that in his judgment vitrified salt glazed pipe was the best material to be used. A committee appointed by the Master Plumbers to investigate the matter, reported to this Committee that in their judgment, based upon their personal observations of the destructive and disintegrating effect of sewage, vitrified salt glazed pipe should be the material used in the sewers of Kansas City.

On the other hand testimony was introduced tending to show that sewer pipe constructed of concrete, under proper specifications and with adequate inspection, would prove satisfactory. Among those who testified in favor of the admission of concrete pipe in competition with clay pipe were Prof. Erasmus Haworth of Kansas University, Hon. John Donnelly, a former city engineer of Kansas City, Mr. A. J. Hammond, ex-city engineer of South Bend, Indiana, and Mr. J. P. Shearer, a member of the Board of Public Works of Milwaukee. These witnesses testified that cement or concrete pipe, composed of proper material, properly made, under proper inspection, and properly cured and inspected, could be properly used in a sanitary sewer of Kansas City. The present city engineer, Hon. L. R. Ash, had prepared a set of specifications, which are more rigid than those adopted by any other city, and these specifications admit cement and concrete pipe in competition with clay pipe.

The inspection of machine made pipe requires careful inspection of the cement, sand, etc., and the presence of an inspector at the plant where the pipe is being made, to observe the manufacture and the curing of the pipe, also a laboratory inspection to guarantee that it meets the requirements of the specifications.

After the most searching inquiry your Committee have reached the following conclusions—First: that approved sanitary engineering requires that the best commercial product should be used in sanitary sewers, for the protection of health and life of the citizens of this community. Second: —that the best material to be used in the sewers of Kansas City is vitrified salt-glazed pipe; that it is the most sanitary, durable and impervious, possesses the greatest strength and permanency, and presents the greatest resistance to deterioration and destruction of all the commercial products for sewer construction now on the market. Third: that bids for finished sewers, based on specifications, including both vitrified pipe and cement pipe that have been submitted during the past few months, show that on an average the cost of the finished cement pipe sewer is greater than the finished vitrified pipe sewer.

Taking into consideration these facts, and the legal opinion furnished us by the City Counsellor, in our judgment this is a matter that should be left entirely to the Board of Public Works, and so we recommend it. We also recommend that the pending ordinance do not pass.

Respectfully submitted, etc.

The Uniform Form of Contract now Under Discussion at Montreal

MEMBERS of the Province of Quebec Association of Architects on Tuesday, March 26th, met in their rooms at Montreal and discussed the proposed standard contract. Mr. J. Venne presided. Owing to a quorum not being present, the discussion was informal, several alterations being made and others suggested to the special committee which drew up the form. The contract is printed in English and French. The committee will consider the various amendments and suggestions and the question will be discussed at a later date. As given below, the contract is in the form as amended by the meeting, and must not be regarded as official or final. The agreement and conditions were thoroughly debated, clause by clause, the alterations made being comparatively few.

The president explained the history of the contract. About two years ago, he said, the Montreal Builders' Exchange brought up the matter and submitted a model contract. This was discussed and referred back, with the result that it was dropped for some time. Then the Builders' Exchange again suggested a model contract, and as the result of negotiations a special committee of the Association drew up the form to be discussed that night. The Exchange had practically accepted the contract, subject of course to final ratification.

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* [illegible] we invite further discussion of the [illegible]

Following are the contract and the general conditions as amended by the meeting:—

The Standard Form of Agreement Approved by the Province of Quebec Association of Architects

This form to be used only with the Standard General Conditions of the Contract.

This Agreement made the............day of..........
in the year Nineteen hundred and ....
by and between ....
party of the first part (hereinafter called the Contractor).
and ....
party of the second part (hereinafter called the Proprietor).

Witnesseth that the Contractor and the Proprietor for the the considerations set forth agree, the one with the other, as follows, that is to say:—

Article 1. The Contractor shall provide all the materials and perform all the work shown on the drawings or mentioned in the specifications prepared by...............
(hereinafter called the Architect), for ....
....
which drawings and specifications are identified by the signature of the parties hereto and become hereby a part of this contract.

Article 2. The Contractor shall complete the whole of the work comprehended in this agreement by and at the time or times hereinafter stated. to wit:—.................
....
and in the event of failure so to do shall pay or allow the Proprietor the sum of ....
.... Dollars
per day as liquidated damages for each day thereafter that the work remains uncompleted.

Article 3. The Proprietor shall pay the Contractor in current funds for the performance of the Contract the sum of ....
.....................................Dollars ($.........)
subject to additions and deductions as provided in the General Conditions of the contract and such payments shall be made .... on the Certificate of the Architect as the work progresses to the value of .... per cent. of the work done and materials incorporated in the building as estimated by the Architect.

The final payment shall be made within............days after the entire completion of the work covered by this contract and its acceptance by the Architect.

Article 4. The said parties for themselves, their heirs, executors, administrators, and assigns do hereby agree to the full performance of the covenants herein contained.

In Witness Whereof the parties to these presents have hereunto set their hands and seals, the day and year first above written.

IN PRESENCE OF

....
....

General Conditions of the Contract

To Apply to All Trades

1.—The Contractor shall provide all necessary plant, tools, scaffolding, materials and labor and shall execute and complete in the best and most workmanlike manner the whole of the work required by the plans and specifications and shall at the conclusion of the work deliver same in perfect condition and to the satisfaction of the Architect.

2.—The Contractor shall examine existing conditions of site and premises before submitting tenders.

3.—The Contractor shall obtain and pay for all necessary permits and comply with all local by-laws or regulations and shall be held responsible for any violation of the same.

4.—The Contractor shall be responsible for the correct setting out of the work and for all lines and levels; but the Proprietor shall establish the boundary lines of the lot and furnish any necessary information as to servitudes.

5.—The Contractor shall provide everything for the proper protection of his work and of the adjoining properties, provide the necessary lighting, and shall hold the Proprietor free from any loss either by accident or by damage to person or property and shall at his own expense insure the workmen under his control against injury or accident.

6.—The Contractor shall do all necessary cutting and repairing of his own work for the accommodation of the other trades.

7.—The Contractor shall remove all rubbish or materials not required and at the completion of the works shall leave the whole of the premises clean and in perfect condition. In the event of separate contractors being employed and a dispute arising the Proprietor shall remove the rubbish and charge the cost of same to contractors as decided by the Architect.

8.—The Proprietor shall maintain fire insurance for the amount paid by him to the Contractor. The Contractor shall insure and hold the proprietor free from any loss by fire on the balance of the work not paid for and for all plant and tools.

9.—The Contractor shall give his work his personal supervision and shall provide a competent foreman for each trade on the works at all time.

10.—The Proprietor shall have the power to order the removal, after 24 hours' notice, of any workman considered to be incompetent; and should the Contractor refuse or neglect to supply a sufficiency of properly skilled workmen or materials of the proper quality, or fail to prosecute the work with due diligence, such failure or refusal being certified by the Architect, the Proprietor shall be at liberty, after 48 hours' written notice to the Contractor, to provide any such labor or materials and to deduct the cost thereof from the contract sum, or shall be at liberty to terminate the employment of the Contractor and to take possession and complete the work included in the contract; and in the case of such discontinuance of the employment of any Contractor he shall not be entitled to receive any further payment until the work shall be finished, at which time any balance shall be paid to the Contractor, but if the unpaid balance shall not be sufficient to complete the works then the Contractor shall pay to the Proprietor the amount of such difference.

11.—The Contractor shall at all times provide safe and proper facilities for the inspection of the works and shall remove within 24 hours all materials condemned by the Architect.

12.—The drawings and specifications furnished being instruments of service are the property of the Architect and must be returned to him on the completion of the works.

13.—Figured dimensions shall be followed in preference to scale and dimensions and large scale drawings in preference to smaller.

14.—Should the Contractor be delayed in the prosecution of the work by the act or default of the Proprietor or by a general strike or lockout of a trade or by any person employed by the Proprietor then the time fixed for the completion of the works shall be extended for a period equivalent to the time lost; but no such allowance shall be made unless written notice is presented to the Architect within [illegible] hours after the commencement of the cause of such delay.

[illegible] addition made upon the order of the Proprietor shall be deemed to make null or void the terms or time of completion of this contract and all additions or deductions shall be made only upon the written order of the Proprietor; and if any additional time shall be required such notification shall be given at the same time.

16.—No certificate given, nor payment made, under the contract, nor partial nor entire occupancy of the premises by the proprietor, shall be construed as an acceptance of defective work or of improper material, or as condoning any negligence or omission.

17.—If at any time there shall be evidence of any lien or claims for which, if established, the proprietor might become liable, and which is chargeable to the contractor, the proprietor shall have the right to retain out of any payment due a sufficient amount to completely indemnify himself against such lien or claim.

Should there prove to be any such lien or claim after all payments are made the contractor shall refund to the proprietor all moneys that the latter may be compelled to pay in discharging any lien on said premises made obligatory in consequence of the contractor's default.

18.—In case of a dispute between the proprietor and the contractor, such dispute shall be submitted to arbitration. The arbitrator shall be one person if approved of in writing by both parties, otherwise each shall choose one arbitrator and these two shall select a third. In the event of failure to agree upon the third arbitrator he shall be appointed by a judge of the Superior Court in the district where said work is performed. The decision of the arbitrator or arbitrators to be final and the cost and expenses of the arbitration to be apportioned as he or they may determine.

Unit Costs of Reinforced Concrete Factory Buildings

An interesting paper on the above subject, of which the following is an extract, was given by Mr. Chester S. Allen, Boston, at the recent convention of The National Association of Cement Users.:

As a general proposition we have found that reinforced concrete is the lowest priced fireproof material suitable for factory construction and while it is true that its first cost will generally run from five per cent. to twenty per cent. higher than first-class mill construction we have recently had several instances where, with lumber at a high price, reinforced concrete has worked out cheaper than brick and timber. It is especially adapted to heavy construction and for heavy loads of 200 lbs. per square foot and over where the spans are 18 to 20 feet centres not even timber can compete with it.

The unit costs of projected or completed buildings are commonly figured either as so much per cubic foot or so much per square foot of area occupied. Table I. gives the unit costs both on the square foot and the cubic foot basis, together with a general description of a number of reinforced concrete industrial buildings of different types erected during the past two years. It will be seen from an examination of this table that the average cost per square foot of these buildings, excluding the one-storey structures, was $1.12, while the average cost per cubic foot was 8.7 cents. The one-storey structures both had reinforced concrete sawtooth roofs and the average cost per square foot was $1.77, while 8.5 cents was the average cost per cubic foot. The above costs are for the finished buildings, including plumbing, but do not embody heating, lighting, elevators, sprinklers, and power equipment. The cost per square foot of floor area was obtained by dividing the cost of the building by the total number of square feet of floor area exclusive of roof area, but including basement floors and the cost per cubic foot by dividing the cubical contents into the cost of the structure.

While no coal pockets are included in Table I. it has been our experience that above 3,000 tons capacity reinforced concrete elevator coal pockets cost from $5.50 to $7.50 per ton of capacity. Standpipes, exclusive of the foundations, average from 2½ to 3 cents per gallon of capacity.

On much of the reinforced concrete work which has been done under our supervision it has been possible, owing to the contract being either on a percentage or a cost-plus-a-fixed-sum basis for us to obtain quite accurate and comprehensive cost data. This data, of course, is only of particular value where all the local color of each specific case is known, but the average results are at least interesting.

The average unit cost of the 1:2:4 concrete in the floors, including the beams, girders, and slabs, was $6.10 per cubic yard and for the columns $6.70 per cubic yard. Where 1:½:3 mixture was used for the columns the average cost was $7.60 per cubic yard. This cost was made up of the items of cement, sand, stone or gravel, labor and plant. The cement, of course, varied greatly with the demand, but the average net cost was $1.35 per barrel, including 3 cents for tests. The sand averaged 80 cents per cubic yard and the crushed stone $1.25 per cubic yard. The cost of labor of unloading the materials and mixing and placing the concrete varied from 65 cents to $2.90 per cubic yard. The cost of plant, consisting of freight, depreciation or rental of mixing and hoisting towers, erection of same, power and coal, and losses and waste on the small tools ranged from 50 cents to $1.50 per cubic yard of concrete placed.

Next to the proper design of the structural features of a concrete building the economical design of the form work is of paramount importance. The truth of this statement is borne out by the fact that on the average job the cost of the forms amounts to about one-third the cost of the entire structure. On the buildings under consideration the average cost of the forms for the floors, including beams, girders, and slabs, was 10 cents per square foot and for the columns 13 cents per square foot. The lowest cost was in a building of the so-called "mushroom" or flat slab type of construction, where by the intelligent use of corrugated iron for the slab forms the cost of the floor forms, including wall beams, was 7 cents per square foot, and the highest cost was for an artistic but not elaborate over-hanging cornice on a 12-storey building which was 32 cents per square foot. This last item rather forcibly demonstrates that any attempt at architectural development is very apt to be a costly proposition.

The cost of the labor of making, erecting and stripping the forms varied according to the price of lumber, design of the structure, method of forming, character of the supervision and the skill of the workmen, from 4¾ to 12 cents per square foot. The cost of lumber, nails and oil, divided by the square feet of forms averaged from 2¼ to 4½ cents per square foot.

The cost of bending and placing the reinforcing steel, including the necessary wire, averaged $10 per ton, the range being from $5.75 per ton to $17.20 per ton.

Granolithic floor finish 1¼ inches thick when laid before the concrete below it had set so as to form one homogeneous slab cost on the average of 4½ cents per square foot. When put on after the rough concrete slab the cost averaged 7 cents per square foot.

Inasmuch as the only economical design of a reinforced concrete structure is one which closely resembles that of the steel skeleton type, the relative cost of the various materials commonly used for curtain walls under the windows may be of interest. The writer has used brick, vitrified tile, concrete blocks, cast concrete slabs and solid concrete walls for this purpose.

The most common type of curtain wall has been either on 8-in. or 12-in. brick wall resting on the concrete beam. The average cost of these walls has been 45 cents per square foot. There is practically no difference in cost between the 8-in. and the 12-in. brick curtain wall as the saving in material is offset by the great amount of extra labor in culling and laying the thinner wall.

An excellent and inexpensive spandrel wall is constructed by using 8 x 12 x 18 in. vitrified tile. This is a non-absorbent wall and when properly laid in cement mortar makes a tight weather proof curtain wall. The cost of this wall averages about 25 cents per sq. foot. If the tile is plastered both sides the cost is about 38 cents per square foot.

TABLE I.—UNIT COSTS OF REINFORCED CONCRETE INDUSTRIAL BUILDINGS

Type of Building.	Dimensions. feet.	No. stories.	Story height, ft. ins.	Live load, lbs. per sq. ft.	Type of Construction.	Col. Spacing. ft.ins. ft.ins.	Total Cost Per sq. ft.	Total Cost Per cu. ft.
Machine shop.	120x 50	4	12 0	150	Beam	10 0x24 0	$1.17	$0.09
Cotton mill	550x129	2	16 0	75	Beam	10 8x25 0	0.98	0.07
		4	12 6	150	Flat slab	17 0x20 0	1.09	0.077
Weaving mill	140x 60	5	12 6	150	Flat slab	17 6x20 0	1.50	0.12
Knitting mill	220x 75	2	14 0	125	Beam and girder	22 0x25 0	1.09	0.073
Factory	223x 56	2	16 0	300 & 1000	Beam and girder	18 6x18 6	1.55	0.10
Weave shed.	341x231	1		125	Sawtooth skylight	13 0x21 4	1.79	0.07
Machine shop	220x100	1			Sawtooth skylight	20 0x20 0	1.75	0.10
Store house.	181x 56	4	14 6	150	Flat slab	18 0x20 0	1.15	0.07
Store house	380x109	10	12 0	250	Beam and girder	19 3x 19 0 25 0	0.85	0.071
Store house							0.76	0.05
Store house	256x100	12	8 0	150	Flat slab	16 0x16 8	1.04	0.12

Where 8-inch concrete curtain walls were cast in place after the skeleton frame was completed the average cost was 40 cents per square foot, and when poured simultaneously with the columns, 48 cents per square foot. Four-inch cast concrete slabs cost about 35 cents per square foot.

While concrete blocks make a very cheap and light curtain wall, the price being about the same as for the 8-in. tile, the writer's experience with them has been rather unfortunate on account of their extreme porosity.

Where the location of the buildings have demanded special treatment of the exposed surfaces we have generally specified rubbing with a block of carborundum. The average cost of this work has been 4 cents per square foot. In two instances portions of the structure have been bush hammered with a resulting average cost of 7 cents per square foot.

Concrete piles were used on the foundation of several of the buildings and the average cost of the piles was $1.15 per linear foot.

The most common methods of waterproofing concrete structures are by the introduction of foreign ingredients into the concrete, by the application of a compound to the concrete surface, by the use of paper or felt waterproofing and by accurately grading and proportioning the aggregate and the cement.

Where an addition of hydrated lime in the proportions of 10 per cent. to the weight of the cement has been used the added cost to a cubic yard of 1:2:4 concrete has been 50 cents. Patented compounds similar to Hydrolithic cement have cost from 25 to 35 cents per square foot of surface covered. On horizontal or inclined surfaces we have sometimes used a granolithic surface of rich mortar of Portland cement and sand, or Portland cement and screenings in the proportions of 1:1 laid at the same time as the base and troweled as in side walls construction. The cost of this work has been about 5 cents per sq. foot.

Taken as a whole, the lowest possible cost of reinforced concrete building can be obtained only by careful study of each particular case to determine the cheapest type of construction and most economical spacing of columns. As a general proposition we have found that for light loads with ordinary beam and girder construction the most economical spacing of columns has been 18 ft. each way and for flat slab construction 20 ft. each way. For heavy loads such as 300 lbs. per square foot and over, it has been our experience that the cheapest column spacing for beam and girder construction is 15 x 15 ft. and for flat slab construction 17 x 17 ft. In arriving at the most economical layout it is always well to bear in mind that the construction which allows the greatest simplicity of form units together with the maximum number of repetitions of same is invariably the one that will work out cheapest in the end. The fact that the actual amount of concrete or steel required for a certain floor construction is less than that required in another by no means implies that this is actually the cheapest floor construction, as the unit labor of the form work may easily have been increased out of all proportion.

Orifices for chemical solutions at the Harrisburg, Pa., water purification plant are made of hard rubber. Mr. George G. Kennedy, superintendent of the water department, reports that this material shows an improvement over the metal formerly used.

Mechanical conveyors are being installed in a number of stations of the British post-office department for carrying documents. The carrier consists of a pair of mechanical fingers, drawn along rails or guides by an endless cord driven by an electric motor. On reaching the appointed stations the fingers are opened or closed automatically in order to grasp or deposit the loads with which they are dealing. The system has been employed experimentally in the Birmingham post-office for about a year.

Approximate Design in Structural Steel

Abbreviated Methods Applicable Mainly to the Steelwork of Office Buildings and Warehouses—Estimating and Checking

By George A. Merrill, Structural Engineer, Boston, Mass.

THE structural engineer employed by a bridge company or structural steel shop is often called upon to work out a design and prepare an estimate at short notice. A bid must be put in, based on fairly accurate data, or a possible contract lost.

During a period of estimating covering some years the writer has derived certain rules and formulas to lighten his labors and to abbreviate his work as much as possible. As his experience has been mainly with building work, this paper will deal more particularly with the steelwork of office buildings and warehouses.

Estimating by Cubic-foot Weights—If time is very limited, or only a very approximate estimate of the weight and cost of the steel frame is desired, the weight per cubic foot of a similar building with about the same floor loads and floor construction can be used. In order to have such information at hand when wanted, the engineer should keep a record of every building he designs, noting therein its height, width and breadth; the style of floor construction; the material and thickness of the walls and whether they are self-supporting or not; the live loads used upon the floors; and finally the weight of steel per cubic foot.

If more detailed and accurate results are desired, some designing must be done.

Estimating from Approximate Design—On the architect's blueprint showing a typical floor, or upon a separate sheet traced from the architect's plan, the engineer pencils in that framing of girders and beams which appears from inspection to give the most economical layout. The location of the columns has generally been determined by the architect and cannot be changed. It remains to figure the sizes of the beams.

Beam Sizes—In general, in an office building or warehouse, similar beams occur in succeeding tiers, having the same span and spacing, but with a different loading per square foot. On this account it is best to write down under the line on the plan representing the beam in question, its size in every tier from basement to roof, making one plan as far as possible serve for all floors and roof. The live-loads upon each floor are known, being determined by regulation or by the architect. The dead-load per square foot must be approximated, which approximation is easily made. Given the span, spacing of beam, and total load per square foot, the size of the beam is readily determined. The figures for beam spacings under various loads given in "Carnegie" may be used, or one of the sliding beam scales.

Another method of getting beam sizes is available, which does not require reference to steel handbook or beam scale, but calls for a simple multiplication, made with the slide-rule or otherwise. Before giving this rule, a hint regarding the spacing of beams may be of use. In scaling from the plan the spacing of the beam in question, the two spaces on either side of the beam should not be scaled, then added together and their average taken; instead, both spaces should be measured as one space, but with a scale twice that on which the plan is drawn, thus obtaining the spacing at once.

The following beam formula is known by many structural engineers, and should be known by all; it gives surprisingly accurate results with a minimum of labor:

Safe load in thousands of pounds = Weight of beam per linear foot multiplied by Depth in inches and divided by Span in feet.

Example: 1. According to this rule, at 16,000 lb. fibre stress, a 12-in. x 31½-lb. I-beam 18 ft. long will carry

$$\frac{31.5 \times 12}{18} = 21\ (000)\ \text{lb.}$$

The Carnegie handbook gives 21,320 lb.

2. A 10-in. x 15-lb. channel 15 ft. long will carry

$$\frac{15 \times 10}{15} = 10\ (000)\ \text{lb.}$$

Carnegie gives 9500 lb. It will be found upon referring to a steel handbook that 1000 × weight of beam × depth in inches corresponds closely to the figures for safe load for a beam 1 ft. long.

The formula or rule above given can be transformed thus:

$$0.001\ W \times s\ S^2 = d\ w'$$

in which

W=Total load per square foot,
s=Spacing of beam in feet,
S=Span of beam in inches,
d=Depth of beam in inches,
w=Weight of beam per foot.

It helps the designer to have before him a table of the values d w', or better still to commit these products to memory; thus $4 \times 7\frac{1}{2} = 30$, $6 \times 12\frac{1}{4} = 73\frac{1}{2}$, $7 \times 15 = 105$, etc.

Wall Beams—If the walls are self-supporting, a wall channel of the same depth as the adjacent beam and of approximately one-half its weight is required. If the wall is carried on steel, a little preliminary work is required before applying the formula. Having the (average) storey height, the (average) thickness of wall, and the (average) percentage of window space, the weight of wall per linear foot of beam is obtained and this must then be transformed into an equivalent space of floor load, which is done by dividing by the floor load per square foot.

Thus, suppose the storey height is 12 ft., the curtain wall 12 in. thick, of brick, with windows out, amounting to 70 per cent. solid brickwork; if the total live and dead-load is 200 lb., then

$$\frac{0.70 \times 120 \times 12}{200} = 5\ \text{ft.}$$

the equivalent width of floor load. The engineer would then draw on his plan imaginary beams 10 ft. outside the wall line, and thereafter deal with the wall beams just the same as with the interior beams.

Note, however, that the formula gives product of weight by height, and that for a compound wall beam this is the sum of the "products" of two beams or a beam and channel; generally the beam and channel are of the same size, so that the combined weight can be obtained readily for a given depth. The matter of shelf angles for such wall sections is left to the judgment of the designer.

Girder Beams—With girder beams, to use the formula, concentrated loadings must generally be transformed into equivalent uniform loadings. The bending moment for a beam freely supported at the two ends is:

For a uniform load

$$M = \frac{WL}{8}$$

For a concentrated load of ½ W at center of span

$$M = \frac{WL}{8}$$

For two concentrated loads of 1/3 W at the third points

$$M = \frac{WL}{9}$$

For three concentrated loads of ¼ W at the quarter points

$$M = \frac{WL}{8}$$

For four concentrated loads of 1/5 W at the fifth points

$$M = \frac{3WL}{25} \text{ (or practically } \frac{WL}{8}\text{)}$$

From these formulas we deduce the following rules for girder beams: (a) For one floorbeam coming at center, or for three or more floorbeams spaced at equal and symmetrical intervals along the girder, the spacing is the same as if the girder beam carried a uniform load extending to the next girder beam.

(b) For two floorbeams coming in at the third points, consider the load as uniform, but the adjacent girder eight-ninths of its actual distance away.

If the girder beam has a uniform loading on one side and unsymmetrical concentrated loadings upon the other, the spacing upon both sides must be found and the average taken, to arrive at the spacing to be used in the formula. For girder beams with floorbeams coming in unsymmetrically, the engineer must use his judgment with regard to the equivalent spacing.

Plate Girders—The formula above stated gives a very close approximation for weight only; for example, given W = 200, s = 20 ft., S = 40 ft., then $0.2 \times 20 \times 1600 = 6400 = d\,w'$; if d = 40 in., $w' = 160$ lb.; allowing 16 per cent for rivets and fittings, the formula gives a 40-in. plate-girder weighing 184 lb. per ft. If this be checked, it will be found that a plate-girder made up of 1 web 40 x 3/8 in., 4 angles 6 x 4 x 9/16 in., and 2 plates 10 x 7/16 in. is required, weighing with 15 per cent. allowance for fittings 176 lb. per ft., or about 5 per cent. less than the approximate weight.

Trusses—For trusses there are no very close approximate rules. It has been the writer's practice, when pressed for time, to estimate the trusses in a building as plate-girders, using as the depth of girder the average depth of truss, and employing the rule above given.

Columns—For approximate results, summarize the total load coming upon the column considered, at a point in the building one storey below mid-height, using the common method of contributing floor area multiplied by total load; and divide the total load by 13,000 and multiply by 4.4. This approximation gives a fairly close average weight per foot of column from basement to roof. The storey heights in most office buildings are such that a column section can be readily found where $\frac{l}{r}$ is 70 or less, so that the column can be figured at 13,000 lb. per sq. in. without deduction. The cubic inches of cross-section thus obtained, when multiplied by 3.4, give the theoretical weight per linear foot, and if 25 per cent. is added to take care of fittings and 5 per cent. for difference between theoretical section and the section as used, we have 4.4 as the factor to be used.

The column should be figured for a total load at a floor a storey below mid-height, to take care of the condition that the top lengths of columns often have their cross-sections determined by the value of $\frac{l}{r}$ or from practical considerations and not by their supported loads, and are therefore somewhat heavier than the consideration of load alone would make them.

The writer offers these rules and suggestions not as any substitute for painstaking design and study, but to show how a surprisingly accurate design (considering the method employed) can be made and an estimate prepared in a very short time.

It is possible at times by these methods to prepare both design and estimate without reference to any handbook or tables. The methods will also be found to be of use in checking designs made in the usual way.—Engineering News.

Depositing Concrete Under Water

Methods of depositing concrete under water have been studied during the past year by the committee on masonry of the American Railway Engineering Association, and certain conclusions on this subject are presented in its report on the basis of replies to a circular sent to a large number of railroads.

It is found that nine methods of depositing the concrete are included in the replies, which are: Bottom-dump bucket, tremie, sacks, sacks withdrawn, paper bags, open chutes, open depositing, pneumatic grouting of broken stone and concrete blocks.

The committee makes a series of observations in regard to general practice in this matter, which are substantially as follows:

Concrete may be deposited successfully under water, if so handled as to prevent the washing of the cement. Cofferdams should be sufficiently tight to prevent current through the pit, and the water in the pit should be quiet.

The concrete should be deposited in place either by means of a drop-bottom bucket or a tremie, and should not be allowed to fall through the water. Where a bucket is used, it should be carefully lowered to the bottom and raised to the surface, so as to cause as little disturbance as possible to the water. Where a tremie is used it should be kept filled with concrete up to the top of the water level, and the discharge end should be kept buried in the freshly deposited mass to prevent emptying, and raised a few inches at a time as the filling progresses. The surface of the concrete must be kept as nearly level as possible to avoid the formation of pockets which will retain laitance.

Where concrete is not deposited continuously, all sediment should be removed from the surface of the concrete, by pumping or otherwise, before depositing fresh concrete. The concrete should be a 1:2:4 mixture and of a quaking consistency. Freshly deposited concrete should not be disturbed.

Where the flow of water through the pit cannot be prevented, concrete should be deposited in cloth sacks.

Brentwood (Eng.) Sewage Disposal Works

THE new sewage disposal works at Brentwood, Eng., are now nearing completion, and the following description of them has been abstracted from a paper read before a meeting of the Institution of Municipal Engineers.

The district embraced in the drainage area comprises the whole of the urban district of Brentwood and portions of the parishes of South Wealds and Shenfield, in the rural ristrict of Billericay, the sewage disposal works being under the control of a joint committee appointed by the urban and rural district councils. The area of the urban district is 460 acres, and the rural district 180 acres, making a total of 640 acres. The urban district has a population of about 6925, the number of houses being approximately 1400. The population of the rural district is 3555 and the number of houses 740, so that the present population of the whole area may be taken at 10,480. The volume of sewage is comparatively high for the population, the dry weather flow having been gauged in February, 1907, at 191,000 gallons per 24 hours. For the new works a dry weather flow, estimated on a basis of 25 gallons per head, of 300,000 gallons, has been taken.

The sewage is at present dealt with by chemical precipitation, lime being used as a precipitant, and the tank effluent treated on land, the area of that portion of the sewage farm which can be irrigated being about 25 acres. Owing to the insufficient area of the farm, a septic tank and contact beds were provided some ten years since, but have proved insufficient to deal with the sewage. In 1907 the Local Government Board were asked to sanction a scheme to treat the sewage biologically on the most modern lines. The whole of the sewage from the drainage area is to be delivered by gravitation, discharging into a detritus tank, screens being provided to remove such floating matter as straw, twigs, rags, &c. From the detritus tank the sewage will pass to an overflow chamber, where arrangements are provided by means of penstocks and bell-mouth overflows for discharging the whole of the storm sewage up to three volumes of the dry weather flow into the sedimentation tanks. All beyond this volume will pass to the storm sewage tanks. A washout is provided for emptying the overflow chamber on to the sludge beds. From this overflow chamber the sewage will flow to the sedimentation tanks. These are four in number, rectangular in shape with concrete floors—paved with blue brick—and foundations, and blue brick walls. Each tank is 100 ft. long by 30 ft. wide, and has an average depth of 6 ft. The total capacity is 450,000 gal. The tanks for the dry weather flow are placed centrally and flanked on either side by storm sewage tanks of similar dimensions.

The sewage will be brought from the overflow chamber into the main inlet channels, from which it will be admitted to the tanks over a weir constructed the whole width of the tank. Weir outlets the whole width of the tanks will also be provided at the outlet end, and scum boards at each end of the tank. The tank effluent will pass over the outlet weir to an effluent channel, which is controlled by penstocks, by means of which it may be delivered to the tank effluent chambers, filters, or land, and the storm sewage to the Ingrebourne River.

For the purpose of emptying the liquefying tanks, the supernatant water will be drawn off by floating arms fitted with valves, the tank being emptied down to top sludge level, and the supernatant water conveyed by gravitation and distributed over the irrigation area. The sludge will be run out at the inlet or lowest part of the tank to the sludge beds, the floors of the tanks being inclined longitudinally and transversely to assist this operation. The effluent from the liquefying tanks will, if necessary, be passed through an effluent tank still further to reduce the solids and remove colloidal matter before being allowed to flow to the filters. There are to be two tank effluent tanks with dosing chambers attached, which will control the feeding arrangements to the high and low-level filters. The tank effluent tanks are constructed on the "Dortmund" principle with conical concrete bottoms and walls of brindle brickwork, each tank being 16 ft. square, 13 ft. 6 in. deep, and having a capacity of 13,000 gallons. An emptying pipe is to be provided to each tank, so as to discharge the effluent over land. The tanks will be fed near the bottom, and the sewage rising upwards will pass over weirs, and thence through a small strainer to the dosing chambers of the filters. The head of water in the tanks will be utilized for forcing the sludge up to the necessary level to discharge on to the sludge beds.

Adjoining the tank effluent tanks are to be the high-level dosing chambers for feeding the filters, these being octagonal in shape, and each having a capacity of 700 gallons. Arrangements are to be provided by which the tank effluent can be brought direct to these dosing chambers without passing through the tank effluent tanks when the amount of solids in the effluent, and the absence of colloidal matter, permit of this. An overflow is also to be provided to the low-level dosing chambers. Alternating syphons are also to be fitted in each chamber.

The filters are six in number and circular in shape, having a diameter of 93 ft. and an average depth of 5 ft. The filtering medium is to consist of clinker, carefully graded, screened, and washed. The walls are of brickwork and the floors of concrete, inclined to a central chamber. Half-pipe channels are provided in the floors, covered with slotted tiles, for collecting and conveying the filtered sewage to the central effluent chamber. Distribution is to be effected by means of Candy-Whitaker distributors, each provided with four arms, the holes being spaced to effect even distribution over the whole area of filters. The filters are arranged in two tiers, three being at the high level and three at the low level, so that double filtration can, if found necessary, be resorted to, the filtered effluent from the high-level filters being then discharged into the dosing chambers feeding the low-level filters.

From the filters after single or double filtration, the filtered effluent is to be collected in a main effluent chamber and to be conveyed to a humus tank constructed on the "Dortmund" principle, circular in shape, 23 ft. diameter and 17 ft. 6 in. deep, the bottom being of concrete, and the walls of brindle brickwork. This humus tank is to have a capacity of 25,000 gallons, and from it the effluent will be discharged direct to the Ingrebourne River. A by-pass chamber is provided to divert the filtered effluent direct to the river should it be found necessary to pass it through the humus tank. Provision is also made for emptying the deposited matter by syphonage on to the sludge beds.

The sludge from the tanks, tank effluent tanks, and deposit from the humus tank is to be discharged by gravitation on to specially constructed sludge beds. These beds are four in number, each 80 ft. by 50 ft., the floors and walls being constructed of concrete. Underdrains are provided, over which 9 in. of clinker is placed, on to which the sludge will be run from the inlet chambers. Arrangements have been made for drawing off any supernatant water from the top of the deposited sludge, this being a new feature, by means of an adjustable weir to each bed, by means of which it will be discharged into chambers and flow to the irrigation area for treatment on land. The underdrains will also discharge into these chambers, and be treated in a similar manner.

The irrigation area consists of some thirteen acres, on to which supernatant water and liquid from the sludge lagoons will be discharged by gravitation and distributed at various points on this area from brickwork chambers with penstocks.

The effectiveness of whitewash as a fire protection and preservative for timber bridges was pointed out by Mr. J. B. Sheldon, supervisor of bridges and buildings of the New York, New Haven & Hartford Railroad in a reference to the experience on the Hartford, Providence & Fishkill Railroad, made in a recent report to a committee of the American Railway Bridge and Building Association. When this road was built in 1855, its timber bridges of both trestle and truss types were heavily coated with common whitewash and at the end of every second year the coating was renewed. This practice was continued for about 25 years, and during that period the fire losses were very small, but upon its discontinuance in 1880, there was a marked increase in loss by fire. Some of these bridges, of the Howe-truss pattern, were in service over 50 years and the timber required very little renewal. This he notes as indicating the preservative value of the wash, but states that for a part of the time the bridges were protected from the weather to some extent by housing. Mr. Sheldon believes that a limewash coating every two or three years materially reduces fire risk at small expense, and that it also forms a wood preservative second only to creosote and special pressure-process protections.

The recent arrival of a large American motor road roller in Jerusalem, and the decision to equip the Holy City with an efficient tramway service, calls attention to what is being done in the modernization of the Holy Land. Indeed, ever since the triumph of the Young Turkish Party over Abdul Hamid some three and a half years ago, Western ideas and modern methods have been gradually introduced. These improvements, too, have been effected so quickly and with so little advertisement that the rest of the world scarcely realizes the progress that has taken place. Among other improvements, Jerusalem is soon to have its own tramway service. This concession has been granted to a French syndicate, which will commence the laying of the lines during the coming summer. Then an English firm has been asked to submit tenders for lighting the city with electric light, and a German syndicate is to improve the water supply by the erection of large reservoirs at the springs of Ain Fairah and Ain Fouwar, situated at the upper part of the valley of the Brook Cherith, some twelve and eighteen miles north of the city respectively.

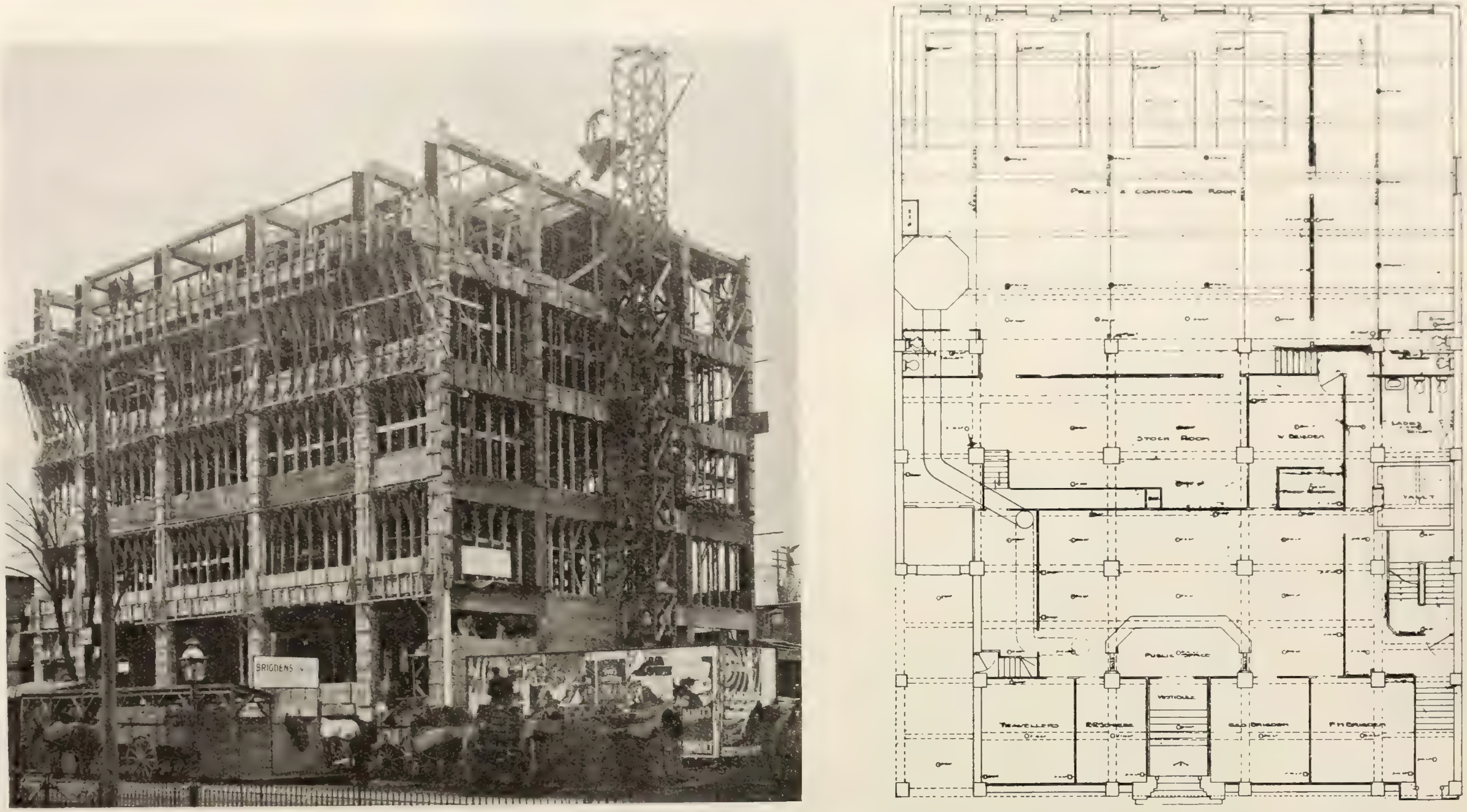
Vancouver's New Fifteen-Storey Building

Towering to a height of 250 feet, the huge steel frame bulk of the Burns' Block situated on Granville street, Vancouver, is a striking example of the handsome office buildings now in course of erection in the city. The building, which represents an outlay of approximately $500,000, is clearly visible from all parts of the city, measures 75 x 120 feet, contains fifteen storeys, and is faced on the front and rear with terra cotta, the sides being of brick. All floors are of reinforced concrete. Two large stores are contained on the ground floor, on either side of the entrance. The walls and ceiling of the entrance will be finished in marble, and a handsome marquise will extend along the entire front of the ground floor. All corridors are fitted with marble wainscoting; the floors are terrazzo and the staircases of marble. Oak is to be used as interior finish throughout.

The New Burns' Block, Granville Street, Vancouver

A feature of this building is the large clock tower. The clock itself is the second largest in Canada, the diameter of the dial being 22 feet across. The complete mechanism of this clock will be run by electricity. The Webster Modulating system of steam heating, and the Durham system of plumbing will be installed. Every office will have hot and cold running water. Three elevators, oil burning boilers in the basement, and motor generator sets to supply heat and power, complete the equipment of the building.

Messrs. Gladding & McBean supplied the terra cotta for the building. The Norton Griffiths Company, Limited, have charge of the construction, and Messrs. Parr & Fee are the architects.

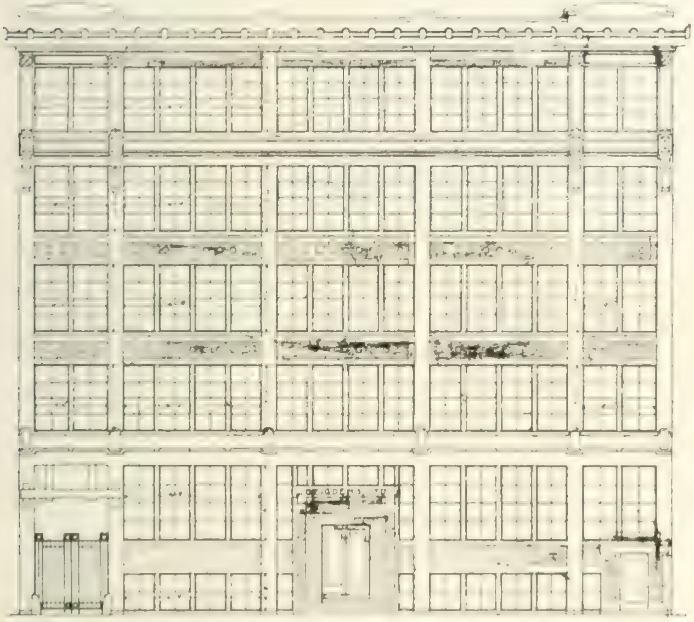


Constructional View and First Floor Plan of New Building for Messrs. Brigdens, Limited, Toronto

New Reinforced Concrete Building for Toronto Engraving Firm

THE new building which is being erected on Richmond street west, Toronto, for Messrs. Brigdens, Limited, engravers, while typical of standard construction for buildings of this class, possesses features of more than passing interest. The architects are Messrs. Bond & Smith, Toronto, and the contractors include Messrs. Jago & Harris, concrete work; Elgie & Page, brickwork, and Fred Armstrong & Company, plumbing and heating. Good progress has been made by the contractors. Operations were commenced early in August last and it is hoped to have the building completed and ready for occupation by June 1.

The building is of skeleton construction and is fireproof throughout, the structural work and floors being of reinforced concrete. An effort has been made on the front of the building to get away from the dead look of ordinary portland cement concrete, and the outer inch of this work in the front is composed of white portland cement and white silica sand. The entire front will be rubbed down with a carborundum block. In order to give some color to the whiteness of the concrete finish, the spandrils between the windows are faced with tapestry brick.



Front Elevation, Brigden Building

The white facing mentioned above is poured at the same time as the body of the concrete, thus making a perfect bond between the two. The solids at the front and rear are no larger than the carrying capacity requires; thus the voids or window openings are as large as is possible and the maximum amount of light is obtained. The curtain walls at the sides are of brick. All the floors are finished in concrete. The office and art floors will be covered later with linoleum, the other floors being hardened by an application of the Master Builder's Method.

The building is heated by a vacuum steam system and will be thoroughly equipped electrically both for light and power purposes. The press room at the rear is lighted from above by a saw tooth roof and has a clear space of fifty feet.

Concrete facia panels on the new stand for the New York Baseball Club were cast in gum shellac molds. The Hy-Rib reinforcement was set up on iron supports, then the form fastened in place, leaving a space of 2 in. for the concrete. The forms were left in this position for three days to permit good hardening to take place before they were chopped off. The decorative figures were cast on the ground in similar molds and attached to the panels after the scratch coat was put on.

Concrete Culvert Building

In an address delivered before the seventh annual convention of the American Road Builders' Association, held in Minneapolis, Minn., W. S. Gearhart, State Highway Engineer of Kansas, made the following remarks regarding culvert construction work:

Good stone laid in cement mortar is very satisfactory either in arch or flat-top slab construction for culverts. If slabs are used, a 4-ft. clear span would require that the flagstones should be 12 inches thick. Six feet is close to the safe maximum span for the flat-top stone culvert.

In the arch construction, the base of the foundations should be sufficiently wide to resist overturning, and be stable under any system of loads without any consideration for the earth fills.

Plain or reinforced concrete is no doubt the best material to use for these small structures, either in the flat-top or arch form. The arch is sometimes objectionable in a flat country, because it is found necessary, in order to get a sufficient amount of waterway, to make a raise in the road, which in many cases is very disagreeable. In the case of the flat-top bridge, the required waterway can be obtained by lengthening the span without making a hump in the road, which hump would in most cases result in a mudhole on either side of it. Where the foundations are not first-class and there is danger of the structure settling, the top can readily be jacked up into place and adjusted, while in the arch form there is very little that can be done to repair injury done by settlement.

There are a number of steel collapsible forms on the market for the constructing of both plain and reinforced concrete culverts, which are satisfactory. There are also adjustable, collapsible wood forms which can very economically be used for the construction of culverts from 18 in. to 4 ft. in diameter.

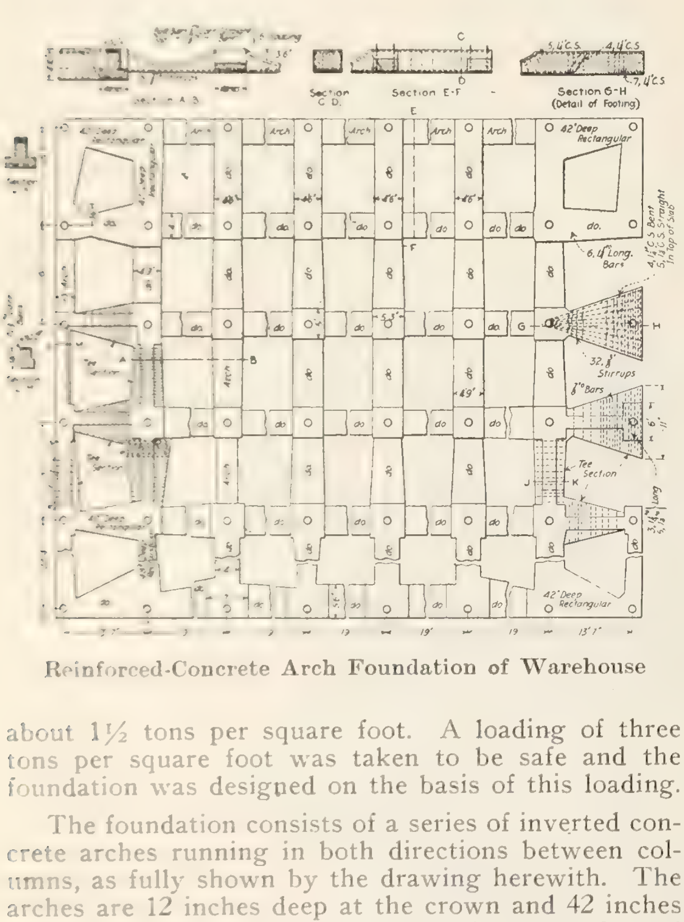
No culvert should be constructed having a less diameter than 15 inches; and a clear roadway between the head walls should not be less than 20 feet, and better 24 feet, at right angles to the road. There should be ample room for teams to pass upon these small structures without stopping.

Careful attention must be given to the angle at which the culvert crosses the road. So far as possible, it should be placed in the direction of the flow of water it is designed to carry. Culverts designed merely to convey water from one side of the road to the other should never be at a right angle to the road. Much trouble in cleaning out clogged culverts, and frequent expensive repairs to the road, may be avoided by placing the culvert at an angle from 30 to 60 degrees. No culvert is complete, regardless of the material used in the barrel, without head walls and wing, both on the upstream and downstream ends, to hold the fill and to force the water through the culvert instead of under it and around it. The downstream end fails first; and a curtain wall should be constructed at both ends of the culvert, extending down at least 2½ feet below the bed of the stream, having a thickness of not less than [illegible] inches, and extending the entire width of the culvert to prevent the water from undermining the structure. These curtain walls should be used whether the culvert is floored or not.

An Inverted Arch Foundation of Reinforced Concrete

An arched building foundation of reinforced concrete was recently built at 418-426 West Twenty-fifth Street, Manhattan, New York City, to the writer's designs. The type is unusual, but it has distinct advantages in simplicity and low cost. Its adoption in the present case was due to the desire to get a shallow foundation; the soil is running sand and the excavation had to be sheeted for the full height on three sides, so that obviously every foot of depth adds to the cost and difficulty of the work.

The building is about 89 x 125 feet and will be eight storeys high above ground. It is to be used as a warehouse. The floor loads are 250 lbs. per square foot and the roof load 30 lbs. The dead-load is 5,350 tons and the live-load, taken at its full amount on all floors, is 11,100 tons, making the total maximum foundation load 16,450 tons. The ground area inside the building line is 11,100 feet. The load is therefore about 1½ tons per square foot. A loading of three tons per square foot was taken to be safe and the foundation was designed on the basis of this loading.



Reinforced-Concrete Arch Foundation of Warehouse

The foundation consists of a series of inverted concrete arches running in both directions between columns, as fully shown by the drawing herewith. The arches are 12 inches deep at the crown and 42 inches under the cast iron column bases; they vary from 4 to 5 feet in width. The reinforcement comprises ⅞-in. round corrugated bars, straight, spaced 6 inches on centres in the extrados; and 1⅛-in. bent bars, spaced 6 inches on centres, in the intrados.

The extrados of the arch was designed flat to give an even bearing on the soil, and the bars in the bottom (straight) are two spans long and are lapped at alternate columns, so that half the bars are continuous under each column. The splices of the others are long enough to develop the full tension in the bars. It was thought that by following this method, more monolithic foundations would be secured and that the foundations would get the benefit of whatever cantilever action there might be.

Before the detail foundation plans were made the bank had been braced and the adjoining building shored, and it was found that some of the 12 x 14-in. braces prevented the placing of the arches as designed. This difficulty was very easily overcome by lowering and curving the extrados the necessary amount, and making the intrados curve deep enough to go under the brace.

The reason for adopting this type of foundation was that the depth limit fixed by the architect was not sufficient for isolated footings, and that steel I-beam grillages would have cost about twenty-five per cent. more in place than the concrete arch foundation. Isolated footings could have been used only for the eight interior columns (out of 48) as the wall column and the columns next the wall had to have continuous footings on account of the ruling by the Bureau of Buildings that footings shall not extend beyond the building line.

All of the end spans are made of either rectangular or T-shaped concrete beams, in order to provide for the thrust from the adjoining arch, which is taken up by the friction between the soil and the foundation, developed by the loads from the columns, and also taken up by the thrust against the outside bank. It was found more economical to follow this method than to make the end span an arch with the necessary tie rods, which would have required covering with concrete.

The widths of the arches and beams were varied to accommodate the varying column loads, so as to give a uniform soil-pressure throughout the entire foundation.

Resal's method for determining the direction and intensity of stresses was used in designing the arches and the results were checked by Lossier's method.

The design as shown gives a foundation area of 4,860 square feet. On the basis of full live-load as above given, the soil pressure is 3.4 tons per square foot. But as full live-load on all floors is a very improbable condition, the live-load was reduced in arriving at the foundation load, by five per cent. on the seventh floor and an additional five per cent. on all succeeding floors, making an aggregate reduction of 1,940 tons or about 11.7 per cent. of the total. On this basis the soil pressure is 3.0 tons per square foot. The same arrangement of live-load would make the total load if distributed over the entire ground area of the site average one and one-half tons per square foot.

Maximum local foundation pressure might occur if one vertical line of columns for the whole eight floors were completely loaded and two adjoining lines of columns on alternate sides free of live-load. This condition would give a soil pressure somewhat higher than 3.4 tons per square foot directly under the loaded column, but it is an improbable condition.

The possibility of cantilever action in a foundation of this kind is worth considering. If the arches should crack in the centre and all arch action should be destroyed, each arm of the foundation beam extending from a column would have to act as a cantilever. The stress in the steel in the longest span would just about reach the elastic limit of the steel, 35,000 lbs. per sq. in.; the concrete stress would remain within safe limits, as the percentage of reinforcement at this point is only about 0.25 per cent. The stresses in the other spans would be correspondingly less.

The steel used in constructing the foundation was structural grade, according to the specifications of the

Association of American Steel Manufacturers. The concrete was of 1:2:4 mixture, using trap rock.

In building the forms 1-in. lumber was used to make the sides of the beams and arches; sand was filled in behind the forms. No attempt was made to salvage any of the lumber except the top board, which was easily removed.

In pouring the arches several vertical stops were placed extending down to the top of the arch, which made the intrados a series of steps instead of a curved surface.

The work was designed by Mr. F. R. Pradillo, Assistant Engineer in the New York office of the Corrugated Bar Company, and built by Mr. Thos. Larkin, President of the McKeon Realty Company, which owns the building, from plans prepared by Mr. Paul C. Hunter, architect.

Motor Trucks for Road Oiling

During the year 1911 all of the macadam roads in Jackson County, Mo., were treated with oil, and motor-trucks were used entirely for hauling and spreading the binder. The following details regarding the methods and costs of the work are from a joint report by Mr. H. Seested, general instructor, under whose direct supervision the oiling was done, and M. R. T. Procter, county surveyor.

In March, 1911, the county had no facilities whatever to begin with except one Sampson 5-ton motor-truck. In April three Seitz 5-ton motor-trucks and two Sampson 5-ton trucks were bought. Tanks were put on the three Seitz machines and on one of the Sampson trucks to haul and spread road oil, the tanks hauling about 1000 gal. per trip. The other two trucks were used to haul grit to be spread on top of the oil. Oil was applied to the full widths of the roads and also to the earth on each side of the macadam.

The macadam was first thoroughly swept with a 5-ft. rotary street broom, hitched to a motor-truck. Then one side of the road including the dirt was oiled and immediately spread with fine grit or dust screenings. After an interval of 3 days the other side was oiled. The length of the parts oiled depended on the distance between the different railroad stations, beginning as nearly as possible at a point midway between stations, so as to work toward the supply station. In some instances the length of the haul was 15 miles, half distances between most stations being about 7 miles. The oil was delivered in tanks on sidetracks at the railroad station, from which it was pumped into the motor-truck tanks.

Each motor-truck was manned by a chauffeur and one man to spread the oil. The spreader is 8 ft. long and has 3 valves, so that either one may be cut off. The first trial was made with a pan under the spreader, which allowed a full 8 ft. spread of oil to fall on the road, but this plan was soon adandoned because too much oil was being applied to the road. The pan was removed and the oil was allowed to run direct from the spreader onto the road and produced better results as the oil was more evenly spread. The pan, by the motion of the truck, especially on the sides of roads with a high crown, caused the oil to run to the lower side and into the ditches. Wherever too much oil was applied to the road or collected in driven by a 250-h.p., 2300-volt, 60-cycle, two-phase motor taking current through transformers from the 11,000-volt transmission line of the local central station company.

ruts, push-brooms were used and the oil brushed over the road.

The dust was all hauled by motor-trucks, each truck carrying besides the chauffeur, 6 men to spread the dust. Particular care was given to steep grades; whenever the dust had absorbed most of the oil another coat of dust was put on.

Another good result was obtained, according to the report, by rolling the roads after the oil was absorbed by the macadam or the dirt, and in many instances through the rolling the ruts were taken out, aud thus the cost of immediate repair of the road was saved.

For about 5 miles, at different places, the dirt road was oiled in lengths of a mile or so, and this application, it was found, not only settled the dust, but shed the rain water and kept the roads smooth and free of rust seven months after the oiling. After frost it was noticed that where the dirt roads were oiled a hard crust did not form as is said to be customary on much-travelled dirt roads. The surface is reported to have been smooth.

Oil was applied to 152.2 miles of road during the year, giving an area of 6,345,404 sq. yd. The actual cost (not including the first cost of the motor-trucks) was 0.7063 cents per square yard. This cost includes oil, labor, surfacing dust, freight, chauffeurs, repairs to trucks, storage and gasoline for operating the trucks.

Cantilever beams of reinforced concrete were recently employed in Liege, Belgium, as a means for widening the roadway of a masonry arch bridge. This bridge, which spans the Meuse river and unites two thickly settled sections of the city, could not take care of the increased traffic without being widened. To avoid seriously obstructing the traffic the following scheme, outlined in the "Genie Civil," was adopted. Reinforced concrete slabs 16 ft. 5 in. long and 5 ft. 3 in. deep were cast and placed as cantilevers along the masonry of the arch below the road bed. Each slab was supported directly on the bridge masonry for a length of 9 ft. 10 in. and securely anchored with three expansion bolts set deep in the masonry. The slabs were connected longitudinally by two reinforced concrete beams, whose reinforcement was securely bonded to that of the slabs. Provision for this bonding was made at the time the slabs were cast. The floor system for the foot walks was laid directly on these beams. At the abutments bearing was secured by a concrete addition to the masonry.

A concrete fire test on a large scale occurred recently at the Blabon Oil Cloth Works in Philadelphia. A four-storey concrete building with wired glass skylight was used as a drying plant for long strips of linoleum, which hung down from iron bars at the top. There were no floors in the building, which was practically a shell. The linoleum caught fire and burned up, and the building was uninjured, although the fire is reported to have lasted several hours.

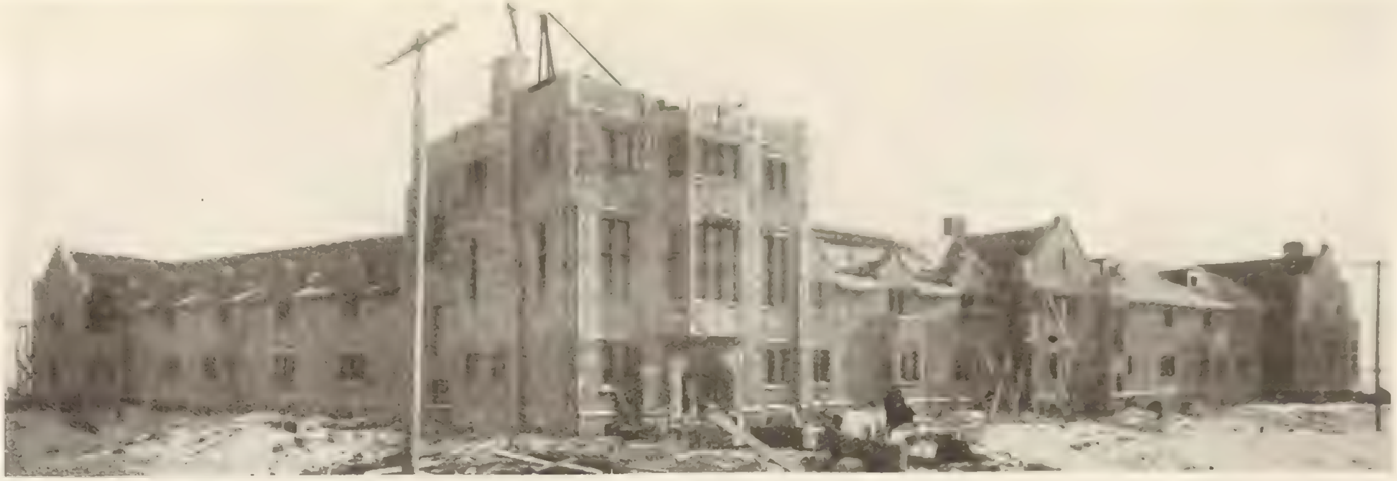
An electrically driven sand pump has been used as a booster pump for filling operations at Galveston. The sand is pumped up by a dredge and discharged through a 20-in. pipe line. The dredge cannot deliver this sand economically to a greater distance than about 3000 ft. but it has proved necessary to deliver it to distances of 12,000 ft. To accomplish this a booster pump has been used [illegible]

New Buildings at Saskatoon for the University of Saskatoon

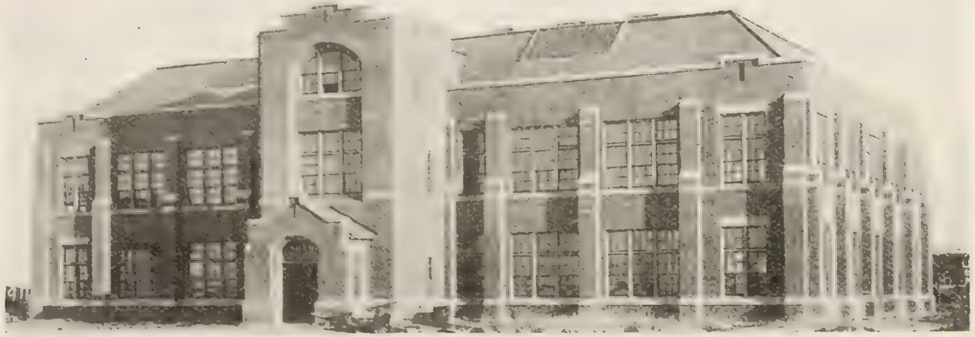
Architects:
Messrs. Brown & Vallance,
Montreal

General Contractors:
Messrs. Smith Bros. & Wilson,
Regina

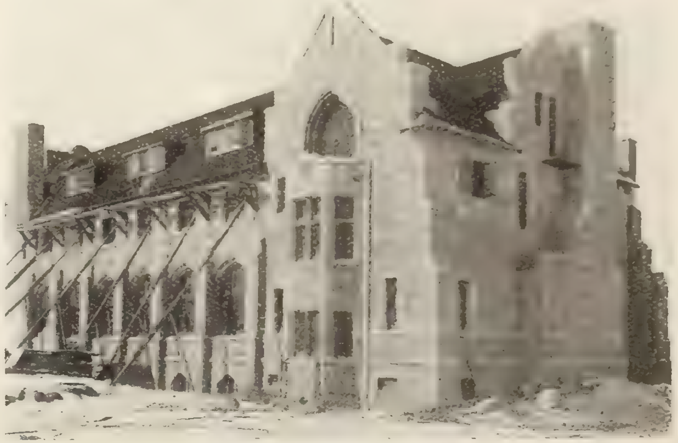
Cut Stone Contractors:
Messrs. Blum & Delbridge,
Amherst, Ohio.



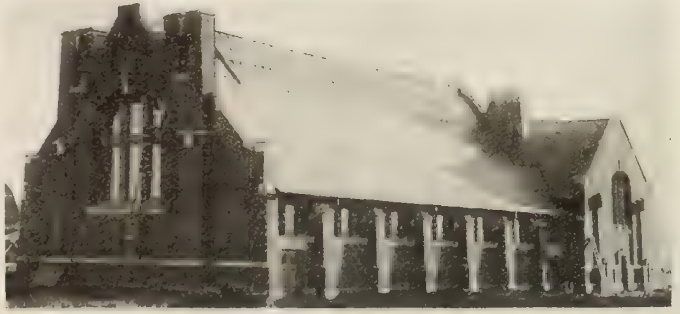
Students' Residence Building.



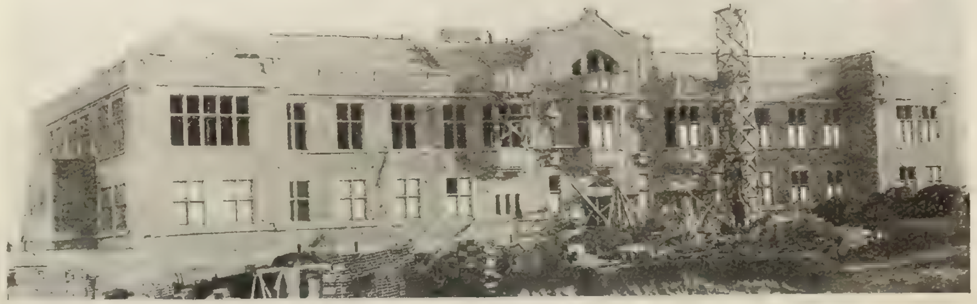
Machinery Hall.



Emmanuel College.



Live Stock Amphitheatre.



Agricultural College.

New Buildings at Saskatoon for the University of Saskatchewan

Good progress is being made in the construction of the various buildings at Saskatoon for the University of Saskatchewan. We are indebted for the accompanying photographs and particulars to Messrs. Blum & Delbridge, cut stone contractors, Amherst, Ohio, who have recently completed their contract for furnishing the sandstone trimmings for the Agricultural College, the Students' Residence building, Machinery Building, Live Stock Building, Power House and the Emmanuel College, all of which stand upon the same campus. The general contractors for this work are Messrs. Smith Brothers & Wilson, of Regina, while the architects are Messrs. Brown & Vallance, of Montreal.

The style of architecture for all the buildings is English Gothic. Three of the buildings are constructed of native ruble stone, with sandstone trimmings. The others are of brick with sandstone trimmings. The sandstone for this contract was mined from the famous "Gray Canyon" quarry of the Cleveland Stone Company, located at Amherst, Ohio. To complete the order, sixty carloads or approximately 30,000 cubic feet of stone was required, all of which was dressed complete, ready to set, in the yard of Messrs. Blum & Delbridge.

The Agricultural College covers an area of 22,350 square feet. The building has two storeys and basement and contains rooms for classes, gymnasium, lockers, machinery, grain, milk testing, cheese making, butter making, etc. The construction is native ruble stone with sandstone trim. The Students' Residence building covers an area of about 24,000 square feet. It has part two and one half and part three storeys and contains dining room (66 ft. 1 in. x 37 ft. 6 in.) and about one hundred bedrooms, besides baths, kitchens etc. The construction is native ruble with sandstone trim. The Emmanuel College, which covers an area of 4,700 square feet, has two storeys and basement and contains lecture and class rooms, dining room, kitchens, etc. It is built on the campus of the university buildings. The construction is native ruble wth sandstone trim. The Machinery Building, the Live Stock Pavilion and the Power House are constructed of brick with sandstone trim.

The plant of Messrs. Blum & Delbridge consists of a mill and power house, 75 feet by 30 feet, and a cutter shed, 116 ft. x 80 ft., with an extension of 54 ft. x 80 ft. now building. The equipment consists of 2 gang saws, one diamond saw, five stone planers, turning lathe for columns, baluster lathe, three electric cranes, and polishing machine. During the busy season last year the firm employed seventy-five men, of whom thirty-five were stone cutters.

Allowable Pressure on Roadbeds of Various Materials

Experience with various roadbed materials showing the service rendered in sustaining heavy traffic loads is discussed by Mr. Alfred C. Prime, assistant supervisor of the Pennsylvania Railroad at Lameburg, N. J., in a memorandum to the committee on roadway of the American Railway Engineering Association.

Rock Subgrade.—A good quality of rock will stand up under the heaviest axle loads, in Mr. Prime's opinion, and under Class A traffic it is sustaining axle loads on one pair of drivers of 61,500 lb. without any signs of failure. Considering this load as distributed over two ties, gives a unit pressure of 850 lb. per square foot. The limit of bearing is unknown, but a good quality of rock will probably sustain, with proper ballast, the highest axle loads that can be placed upon it.

Clay Subgrade.—Mr. Prime states that he has never had satisfaction in maintaining tracks where the roadbed subgrade was composed of clay. It has always resulted in a high maintenance cost. The track will get out of line and surface and will require from one-third to one-half as much work again as where loam or sand is used. He believes that clay should never be used in fills on account of its high maintenance cost. He finds that a good grade of yellow clay under Class B traffic and axle loads of 61,500 lb., with 6 inches of cinder ballast, will just sustain a pressure of about 900 lb. per square foot. Speed of trains average 60 miles per hour in this case.

Sandy Loam.—This has always given satisfaction where Mr. Prime has used it and had to maintain track. Under Class A and B traffic with speeds of 60 to 70 miles per hour and a proper depth of ballast, he states that it will maintain the heaviest axle loads that can be placed upon it. It is maintaining pressure of 900 lb. per square foot in cases on record.

Ocean Sand.—For Class C traffic this is a satisfactory subgrade for loads up to 700 lb. per square foot, Mr. Prime states, which is about the limit of economical maintenance in his estimation. A sand subgrade can be made to sustain Class B traffic by raising the track about 18 inches on engine cinders.

All figures given above are for a single-track roadway 20 feet wide, with slopes of 1½ to 1, and good drainage, with 6 inches of cinder ballast below ties placed 22 inches apart.

The only cheap and inexpensive method for determining unit pressures on subgrades known to Mr. Prime is to spread some pliable substance such as fairly thin sheet-lead on top of the subgrade for a length of about 5 feet. As long as this remains straight and undeformed the allowable unit pressure on the subgrade is not being exceeded, but when it becomes cupped and dished under the ties, the unit pressure for this class of roadbed subgrade is too high.

The use of hydrated lime as a top facing or binder for macadam and earth roads is discussed by M. A. Salte in a recent issue of "Nouvelles Annales de la Construction." This substance is applied to the surface of the roadway with a form of shaker, at the rate of about 2 lb. to each square yard. This small amount of lime is said to bind together the dust and other fine material and under the action of water forms an impermeable coating over the surface of the road. It is stated that this method has been used with success in Ardeche, France, although to a limited extent.

Alcohol, glycerine and water, properly mixed, will keep a motor from freezing when applied with caution. The mixture should be approximately one-quarter alcohol, one-eighth glycerine, and five-eights water, which will stand a freezing test of 10 degrees below zero. Rubber hose connections must be watched, because of the deteriorating effect of glycerine and alcohol, and the system must be watched for evaporation in the cooling system. When the motor is to stand in the cold for a lengthy period, the water should be drained from the circulating system.

Construction of the Harbor Works at Victoria, B. C.

It is evident from the energetic manner in which Hon. Mr Monk, Dominion Minister of Public Works, is proceeding with the construction of the breakwater and harbor works at Victoria that the city will be fully prepared for the great increase in the shipping trade of the North Pacific Ocean which will follow the opening of the Panama Canal. Mr. G. A. Keefer, resident engineer of the Public Works Department at Victoria, has begun the preparation of plans and specifications for the breakwater designed by Mr. Louis Coste, the harbor engineer, who paid a visit to the Island city in December last to investigate the requirements, and tenders will be called for the wharf as soon as the plans and specifications are completed. The construction of the breakwater will be followed by the erection of the piers, warehouses, ferry slips, trackage and other works laid down in the plans submitted by Mr. Coste, and no time will be lost in carrying out the scheme of harbor improvement. Provision will be made for considerable trackage space. Connection with the outer harbor works will be provided by a bascule bridge crossing from Songhees to Laurel Point with trackage on Montreal street, and spurs to the various piers with their warehouses. With the placing in service of modern car ferries between Victoria and the mainland in view, provision is to be made in the harbor works for the construction of car-ferry slips, where the trains will be loaded and unloaded.

The first work of the outlined scheme of harbor improvement will necessarily be the breakwater from Ogden Point. This will extend westerly for 2,500 yards, reaching into water 65 feet deep. It will provide shelter for the shipping, plying and berthing at the modern piers to be provided in the enclosed harbor. The methods of constructing breakwaters are varied. That suggested in the plan of Mr. Coste is on the mound principle. For the purpose of this method no preliminary dredging operations are necessary. The material for the mound is spread on the sea-bottom direct. From the very nature of things, it will spread itself sufficiently to distribute its weight within the limits of support, or it will sink until it reaches some firmer substratum by which the settlement becomes arrested. The rip-rap stone for the mound is deposited in three different ways: by tipping from barges or other craft afloat, by discharging from travelling gantries, or from cranes running on temporary overhead staging, and by discharging from cranes running over roads laid at about the level of the top of the mound, the trucks being tipped in advance of the finished mound on which the roads are continuously extended as the work proceeds.

The first of the piers with its accompanying warehouses and cargo-handling appliances to be constructed, will be that nearest the present outer wharves, the shorter pier of the five, being 500 feet in length. Another pier 1,100 feet in length is provided for on the inside of the breakwater. With the two outer wharves, which now berth liners plying here, one over 700 feet and the other over 1,000 feet long, and the new piers, berths will be provided for the increasing shipping, while the other piers, one 700 feet long, another 720 feet long, and another 800 feet in length, are being built.

Provincial Hospital at Mount Coquitlam, B. C.

The Vancouver correspondent of the Contract Record reports rapid progress upon the construction of the Provincial Hospital at Mount Coquitlam, B. C. A commodious new hospital is being erected on the hill above the Coquitlam station and when the full plans proposed are carried out there will be a series of buildings forming the most complete institution of the kind in the Dominion. There is now nearing completion a large reinforced concrete structure, faced with bricks and fireproof throughout, which will accommodate some six hundred male patients. At the time of writing tenders are being called in New Westminster for the complete equipment of the institution at Coquitlam. The contractors, the Westholme Lumber Company, have undertaken to complete the present building for occupation by July 31. Early in August operations will be commenced upon another large building. In the front of the series of buildings there will be the administration office. There will also be a number of subsidiary buildings for residential, laboratory and other purposes.

Important Harbor Developments near Vancouver

Discussing the dock and harbor scheme contemplated at Lulu Island near the mouth of the Fraser River, Vancouver, by the Vancouver Harbor & Dock Extension Company, Limited, Mr. C. F. Pretty, of this company, discloses some interesting information concerning the extended operations to be undertaken as soon as the plans are approved by the governments, and permission is given to the company to reclaim the sand flats for dockage purposes. Mr. Pretty says:

"The project of this splendid fresh-water harbor is of such great importance, not only to Vancouver, but to Canada and the Empire, that it might be considered international. Vancouver is the true port of the Pacific Coast of America, and it must prepare to handle more commerce probably than all the other ports of the Pacific. It is the gate through which all the trade of the East will flow from the Phillipine Islands, Australia, Japan, China and Northern Russia, with their hundreds of millions of population. The awakening of these millions to modern commerce and luxuries will create a volume of trade prosperity that the world has not heretofore seen. Every railway that crosses the continent, either to the north or south, is incomplete until it terminates at Vancouver. We are the British outlet to the Pacific, and as the railways terminate with us so will the great steamship lines come to us if we make ready for them. Burrard Inlet is an excellent land-locked harbor, and every available foot will be used, but it is already congested, or else too expensive. Besides this, the Narrows make it hard of access for very large ships that must come to our ports on the completion of the Panama Canal. Along Burrard Inlet there is no room for railway terminals or manufacturing sites.

For these reasons I divide Vancouver as follows: from Burrard Inlet to False Creek is Commercial Vancouver; from False Creek to the North Arm of the Fraser is Residential Vancouver; from the North Arm of the Fraser to the main Fraser is Manufacturing Vancouver; and, laid out with this end in view Vancouver will make one of the finest cities of our Dominion.

"The Vancouver Harbor & Dock Extension Company, Limited, studied long and carefully every point of advantage before they chose the position of their docks, and the spot we have chosen has advantages that few ports in the world have. First, we open both the North Arm and the main mouth of the Fraser River. Secondly, we are entirely a fresh water port, open all the year round. Thirdly, we are close to deep water, where ships can drop alongside our docks either in foggy or stormy weather without danger. Fourth, we can create more mileage of deep-sea docks with less cost than any other place near Vancouver. Fifth, we have unlimited area of cheap land for manufacturing and railway terminals. In short we have an unique position where we can create one of the most economical and extensive all-the-year-round ports in the world at the least cost, and create for Vancouver a place among the great ports of the world.

"We are negotiating with most of the large railway systems as to making these docks their terminals, also with the large steamship interests that will come to Vancouver upon the completion of our docks, and I am negotiating with many of the heads of the railway and steamship interests, also banking interests that will be interested in the financing of our tunnel and docks."

Mr. Pretty concludes with the statement that while his company own all the land along the waterfront. with the riparian rights, the governments have control of the foreshore, and certain formalities will have to be gone through before permission can be granted to reclaim the sand flats for dockage purposes.

Architect's Power to Effect Radical Changes in Building Work

For several days the Superior Court, Montreal, has been engaged in hearing a case of importance to contractors, The question involved is the power of an architect to make changes in the carrying out of building work, and a large number of witnesses was called by both parties to the action. The litigation arose over the Blumenthal Building, St. Catherine street, Montreal, the contractors for which, Messrs. D. G. Loomis & Sons, sought to recover $6,698, balance of the contract price of $150,000. The defendants are Dame Silverstone and others, proprietors of the building, who contend that the work did not come up to plans and specifications in many respects. To this, plaintiffs make answer that the architects are by the contract named arbiters in the matter of determining whether work was being done according to plans and specifications, and as the contractors obtained final certificates from the architects (Messrs. C. A. Mitchell and David Ogilvie), declaring that the work had been satisfactorily carried out, there was nothing for the owners to do but to pay the account rendered.

The whole question, thus resolves itself into a discussion as to the exact extent of the powers possessed by the architects in the matter of seeing to the proper carrying on of the work under a contract. Defendants point to several instances where the contractors, it is asserted, have failed to follow the plans and specifications, maintaining that the deficiencies alleged are substantial ones and thus cannot be considered by the architects. If the latter's powers are to be considered sufficiently wide to countenance such changes in the plans and specifications, there is nothing to prevent an architect from authorizing a contractor to put up a five storey building when the plans call for a six storey one, or to permit the contractor to build up a brick frontage, when the plans call for cut stone. In other words, it is contended if the architect's powers are unlimited, they include that of substantial changes in the plans and specifications, and thus a proprietor, once he entrusted work to an architect and contractor, would, notwithstanding all the plans and specifications imaginable, be wholly powerless to insist on having the kind and quality of building which he had decided to erect.

The clause setting forth the powers of the architects, in the specific contract covering the construction of the Blumenthal building reads as follow:

"It is understood and agreed by and between the parties hereto, that the work included in this contract is to be done under the direction of the said architect and that his decision as to the true construction and meaning of the drawings and specifications is to be final."

This, according to defendants, simply means that in cases where the plans and specifications need explanation, the architect is to be the judge. He is to interpret these plans and specifications. But in cases where the plans and specifications are absolutely clear, he is, according to defendants, simply to see that they are followed. Thus, defendants allege a specific instance wherein a substantial change in the specifications was brought about, with the approval of the architects. This occurred when an interior wall, which according to plans and specifications was to be of solid brick eight inches thick, was put up in four-inch terra cotta. Again, another alleged change took place, when certain flooring which according to plans and specifications was to be of No. 1 birch, was laid in No. 3 quality birch. Other similar changes took place in regard to concrete floors, and plumbing arrangements, all of which was tantamount to reading into the plans and specifications a sense directly contrary to that which they bore on their face.

The plaintiffs on the other hand, deny the contentions of the defendants, and point to the fact that the work in connection with the building was carried out under the direct supervision of, and to the entire satisfaction of the architects. According to the specific provisions of the contract as well as the custom governing the building business, the contractors worked under the supervision of the architects, being subject to the latter in all things connected with the carrying out of the work. The architects were constituted supreme arbiters in the matter of interpreting specifications and plans. The fact that the contractors received from the architects certificates for final payment showed that the work had been carried out to the satisfaction of the architects or the one who had full charge of deciding just how the work should be carried out.

The certificate of the architects states that the building was completed according to contract.

Judgment will be delivered at a later date.

The reinforced concrete bulkhead which is being erected by Messrs. Norton Griffiths & Company, Limited, for the Lonsdale estate, along the 800 feet adjoining the Indian Reserve, North Vancouver, is a unique construction, said to be the only one of its kind in the northwest, if not on the entire Pacific Coast. The bulkhead is the commencement of a million-dollar scheme that is to be executed within the near future. The bulkhead is to be erected first and then the foreshore dredged. The material taken from the bottom of the Inlet will be placed behind the bulkhead, forming the ground on which the docks and wharves will rest. The method of construction briefly is this: reinforced concrete piles are sunk into the foreshore and anchored firmly to the back shore by means of large steel rods. Between these piles, huge slabs of reinforced concrete are constructed. These are the real force in holding the dock and earth in place.

The Amalgamated Boards of Trade of South Vancouver, Point Grey and Richmond, Burnaby and New Westminster, have united in petitioning the Dominion Government to commence the work of dredging the North Arm of the Fraser River immediately, in view of the early opening of the Panama Canal. The present plans call for the river to be dredged to a depth of fifteen feet from New Westminster to the mouth. and the joint harbor committee have already interviewed the resident engineer on the matter. He stated that a new dredge was being built for use on the Fraser River, and in order to facilitate matters, urged the different municipalities interested to take action, so that a strong deputation could be sent to Ottawa. The dredging of the North Arm of the Fraser will mean a new area for New Westminster as a fresh water port and is certain to result in great development along the six miles of water frontage in Burnaby.

A Distinguished Engineer

THE engineering profession in Canada will learn with interest that at the laying of the stone of the new County Hall of the London, Eng., County Council, His Majesty conferred the honor of knighthood upon Mr. Maurice Fitzmaurice, Engineer of the Council.

Sir Maurice Fitzmaurice, C.M.G., M.A., the eldest son of Mr. R. Fitzmaurice, M.D., of County Kerry, Ireland, was born at Tralee, County Kerry, in 1861, educated at Trinity College Dublin, and obtained the degree of M.A. and M.A.I., Dublin University. He was pupil to the late Sir Benjamin Baker, K.C.B., K.C.M.G.; worked in the office of Sir John Fowler and Sir Benjamin Baker during 1883, and in 1884 was appointed assistant at the Forth Bridge under the same engineers, and remained there until the completion of the work in 1888. In the latter year he came to Canada in charge of the construction of railways and docks, and continued on this work for three years. He was then engaged for a short time on Irish railways, but returned to Sir Benjamin Baker's office in 1891, and was identified for a year with the reconstruction of the bridges on the London and Brighton railway. In 1892 he was appointed resident engineer by the London County Council on the construction of the Blackwell Tunnel under the Thames. On the completion of this work he was appointed by the Egyptian Government to take charge of all the works in connection with the Nile reservoir at Assouan. On the completion of the Assouan Dam, at the end of 1901, he was appointed Chief Engineer to the London County Council. Since 1901 he has constructed the electric tramways in London, the new Vauxhall Bridge, the Rotherhithe Tunnel (a description of which Sir Maurice has kindly furnished us for publication in an early number of the Contract Record), Kingsway, and tramway subway underneath. For some years he was engaged on the duplication of the London main drainage system, which was effected at a cost of something like $20,000,000. He is a member of the Council of the Institution of Civil Engineers. and a member of the Institution of Mechanical Engineers; he obtained the C.M.G. for work in Egypt, and also the Order of the Mejidieh.

Sir Maurice Fitzmaurice, C. M. G.

The new knight has had considerable connection with Canada, but he will be remembered most prominently on account of his appointment to the Board of Engineers for the Quebec Bridge, a position which he resigned owing to stress of other work. He is a member of the Canadian Society of Civil Engineers.

Sir Maurice Fitzmaurice is well known as the author of many standard publications on engineering subjects, and as the writer of many valuable papers. Among his works may be mentioned: Plate Girder Railway Bridges; London County Bridges, and Main Drainage of London.

Sir Maurice is a Lieutenant-Colonel in the Engineer and Railway Staff Corps. He is a member of the Reform Club, of London.

Personal News and Notes

City Commissioner McPherson, of Regina, has resigned.

The C. P. R. have appointed Mr. C. W. Ramsey engineer of construction for their eastern lines with head offices at Montreal.

Mr. Arthur Chamberlin, Secretary of the Calgary Builders' Exchange, has resigned to take up a position with the Westinghouse-Church-Kerr Company.

Congratulations to Messrs. Dinsdale & Malcolm, of Victoria, B.C., who have obtained the contract for the new High School in that city. Their tender was $344,000.

Mr. W. T. Wilson, of the engineering staff of the Montreal Light, Heat & Power Company, has been appointed general manager of the Dorchester Electric Company, Quebec.

Mr. Thos. H. Mawson, the well known British landscape architect, arrived in Vancouver last week. Upon leaving that city Mr. Mawson will visit Calgary, Winnipeg and New York, and then return to London.

The death occurred in California during the early part of March, of Mr. Albert Adams, a resident of Vancouver and a well-known contractor. The deceased was a brother of Mr. Ambrose Adams, of the Adams Construction Company, Vancouver.

Mr. S. P. Brown, of New York, has been appointed chief engineer in charge of the tunnel work in connection with the Canadian Northern Railway Montreal scheme. Mr. Brown is a Canadian who has done a large amount of tunnel work in New York.

Mr. Jno. Kennedy, consulting engineer to the Montreal Harbor Commission, was a member of the Canadian deputation that protested at Washington against the proposed increased diversion of the waters of the great lakes by the Chicago Drainage Canal.

Mr. J .W. Orrock has been appointed Engineer of the Lake Superior Division of the Canadian Pacific Railway, with office at North Bay, in the place of Mr. Frank Taylor, who has been transferred.

At Ottawa last week there occurred the death of Mr. J. L. P. O'Hamly, a well known railway engineer, who in 1881 was on the western boundary survey of Manitoba and who reported later on the effect of the Chicago Drainage Canal on the level of the Great Lakes.

We regret to report the death of Mr. Samuel Leitch, engineer in charge of the new Government House at Toronto. The late Mr. Leitch, who was a son of Mr. James Leitch, K.C., Chairman of the Railways and Municipal Board, was only in his 26th year. His death resulted from pneumonia, following a cold.

Mr. F. F. Busteed, Vancouver, B. C., for five years general superintendent of the British Columbia division of the Canadian Pacific Railway, was recently the guest of honor at a banquet held in the Hotel Vancouver on the occasion of his departure for Winnipeg, where he will assume charge of the Manitoba division of the railway. Railroad men from all departments of the C. P. R. were present. Nearing the close of the proceedings Mr. W. F. Salsbury, local C. P. R. treasurer, presented Mr. Busteed with a grandfather clock and a solid silver dinner service.

Four inspectors have been added to the staff of Montreal building inspectors. They are Messrs. J. N. Gauvreau, R. C. Lucas, E. T. Leclair and G. R. Vincent. The first-named will have charge of theatres and moving picture shows, and Mr. Lucas will supervise markets, etc. It is hoped with these additions to more rigidly enforce the building regulations, concerning which there have been many complaints.

Mr. A. R. Mann, president of the Northern Construction Company, who with his family recently removed from Winnipeg, has purchased a residence at Shaughnessy Heights, Vancouver. Mr. Mann decided to make his headquarters in Vancouver rather than in Winnipeg on account of the large amount of railway construction work that he is directing in British Columbia and in Northern Alberta.

At a recent meeting of the South Vancouver council, Mr. W. A. Clement, formerly city engineer of Vancouver, was appointed chief engineer to the municipality at a salary of $350 a month. Mr. W. H. Baxter received the appointment of assistant engineer, at a salary of $250 a month For two years the latter has been assistant engineer with the British Columbia Electric Railway Company.

Mr. W. A. Clement, who has been appointed Engineer of South Vancouver

The award of the contract for the first 6,900 feet of the jetty at the Sandheads near the mouth of the Fraser River to the Sinclair Construction Company, of New Westminster, B. C., has been confirmed. Mr. Sinclair's bid of $171,350 was the lowest tendered, and he has been making steady preparation for the work during the past few weeks. This expenditure, however, is only part of an outlay of $1,500,000 for a Fraser River harbor scheme to be undertaken within the next three years, and of a further expenditure of $2,000,000 if necessary. The future of the Fraser River as a harbor seems to be assured, and it only remains for the city of New Westminster to provide wharves and docks to ensure its use by the shipping world.

Canadian Railroad Developments

The Canadian Pacific Railway are about to survey a line from Granby, Que., to Farnham. Mr. G. H. Gardner. C.E., will be in charge of the staff.

A notable contract let recently in Winnipeg was that awarded to Messrs. C. W. Sharp & Son, for the new C. P. R. office building at Edmonton. The architect is Mr. W. W. Blair, of Winnipeg. The estimated cost of the structure is $400,000.

The Grand Trunk Railway have let a contract to John S. Metcalf Company, Limited, Montreal and Chicago, for rest piers for a new swing bridge at Back Cove, Portland. Me. Double walled caissons, open type, will be used, the piers being of concrete. The estimated cost is approximately $40,000.

The Grand Trunk Pacific Railway are planning the erection of five or six modern tourist hotels in the neighborhood of Edmonton. Mr. R. C. Lett, Colonization Agent of the Company, has been selecting sites for the buildings. Miette and Mount Robson have been chosen as sites for two of the hotels, and operations on these buildings will be commenced at an early date.

Messrs. McCafferty & McQuigge, of Toronto, have been awarded the contract for the grading of the Charlton to Elk Lake section of the Temiskaming & Northern Ontario Railway. Twelve companies in Canada and the United States competed for the work. The successful bid was $180,000. The line is 30 miles in length, necessitating the construction of two large trestles ocer the Montreal River and at St. Jean Baptiste.

The Terminal Railways Company of Vancouver recently deposited in the land registry office a plan showing that they are applying for an irregular piece of territory in the bed of False Creek under the old and new Granville street bridges, about forty acres in all. Proposed railway tracks are shown occupying the ground. The company are also applying for certain foreshore at Point Grey, the plan showing a breakwater some distance from the land, at Spanish Bank, and between the breakwater and the land a deep water harbor with about 150 acres of wharves. Apparently the company intend to reclaim upwards of 350 acres of the sand banks off the Point Grey shore.

According to a report from Ottawa a company in which Montreal capitalists are interested has been formed to build a railway from the mouth of the Nottaway River, on James Bay, south to the National Transcontinental, as an alternative to the Hudson Bay Straits line. It is proposed to construct an air line from Montreal, twenty-six miles north to meet the National Transcontinental on its 837th mile from Moncton. From this point of junction the same enterprise will push noth 300 miles to Nottaway, a port on James Bay. A most important matter for Montreal is the opening up of the great hinderland which the extension of the boundaries of the province into the vast Ungava region now presents.

Mr. C. H. Boyles, of Spokane, has received contracts and sub-contracts for C.P.R. construction in the provinces of British Columbia and Alberta, amounting to $1,400,000. The sub-contracts are for the construction of bridges, and were obtained of Welch & Griffin, and the other work for the erection of tanks and the drilling of wells. Mr. Boyles has gone to Kamloops, east of Vancouver, where he will establish headquarters. The bridge work is within a territory 43 miles in length, east of Lytton. The tank work is between Vancouver, B.C., and Edmonton, Alta., and east of the latter point. Tanks will be erected 40 miles apart. Work in both departments will proceed simultaneously and will require two years.

Expeditious Work at the Coast

Nanaimo, Vancouver Island, now boasts of one of the finest coal bunkers in Canada. This structure was built for the Vancouver Nanaimo Coal Mining Company in the record time of ninety days. On account of the great expansion of trade the mining company instructed Messrs. Edgell & Dixon, of Vancouver, to rush the work of completion, and acting in conjunction with Messrs. Ironside, Rannie & Campbell, the final touches to the job were made on Saturday, March 9. The new double deck wharf is six hundred feet long, built with fir and Australian hardwood piles, and the length over all extends for a distance of a mile from the intersection of the old railroad to the sea. The bunkers are loaded with forty-ton trip hopper bottom cars, and the coal is conveyed from the bunkers to the wharf by means of gravity, the full cars pulling the empty ones up the grade—eight cars to a trip, each weighing three tons. The cars are then made to travel along the wharf by means of an endless wire rope.

Coal Bunkers, Nanaimo, B. C.

Important New Industry at East Toronto

There is now under construction at Victoria Park Ave., East Toronto, under the supervision and design of Mr. A. J. Parkhurst, an up-to-date mixing plant for the manufacture of Alabastine hard mortar, a high grade hard wall plaster. The plant is being erected for a concern which has quite recently secured a charter, viz., Alabastine Hardmortar, Limited, of which Mr. E. Hooper, of Toronto, is managing director. It is believed that this plant when completed will be second to none in America as far as efficiency is concerned. Mr. Parkhurst has had a life-long experience in the gypsum business and has erected several large mixing plants for the United States Gypsum Company. The last plant erected under his supervision is at Milwaukee, Wis., and is considered one of the most up-to-date on the continent. Machinery of the very latest type will be installed in the plant at East Toronto. The building is well under way and it is expected that the plant will be in operation by May 1st. The building rests on a concrete foundation and is of heavy mill construction throughout. It is served by a double track siding from the Grand Trunk Railway at York Station.

In addition to manufacturing hard mortar the company will also carry on business as selling agents for the various products of the Alabastine Company, Limited, of Paris, Ont. They will also handle a full line of gypsum partition blocks which are manufactured at the Caledonia plant of the Alabastine Company. It is confidently anticipated that a large trade will revelop for these partition blocks for use in office buildings, apartment houses and similar structures.

Construction News and Notes

Supplementary estimates to the value of nearly $20,000,000 were tabled last week at Ottawa by the Minister of Finance.

The Permanent Construction Company, Limited, capitalized at $10,000, have obtained a charter. Their head office will be at Vancouver.

A certificate of incorporation has been granted to British Columbia Granitoid & Contracting, Limited, Vancouver, B.C., capitalized at $100,000.

At a largely attended meeting of the citizens of Quebec, recently, a resolution was adopted asking the Government to construct a dry dock at the port.

Mr. D. Horton, of Victoria, is the architect for the new bank building for the Northern Crown Bank, which will be erected in Victoria at a cost of $150,000.

Messrs. Robt. W. Hunt & Company, Limited, announce the opening of an office in Vancouver, B. C., at 415 Bank of Ottawa Building (Telephone Seymour 2199), under the management of Mr. Geo. E. Hermann.

It was stated at a meeting of the town council of Montreal South that the town had no building lines. Steps are being taken to remedy this and to engage Mr. A. Vincent, Engineer to Longueuil, to do the necessary work.

The contract between the Dominion Government and Norton Griffiths & Company for the development of Courtenay Bay, St. John, N. B., which involves an expenditure of upwards of eleven million dollars, was signed last week.

The Court of Appeal, Montreal, has dismissed the case of Mr. S. Cochenthaler against the J. B. U. Pauze Company, Ltd., an action for damages resulting from loss of trade owing to the construction works of the Banque Nationale building carried on by defendant.

The building news item of the week for Montreal is the erection of a 10-storey structure at the corner of St. John and Hospital streets by the Louis Estate at a cost of $750,000. Operations will start on May 1. It is hoped to complete the building within a year.

The Vancouver-Portland Cement Company lately purchased a steamer in England for use in conveying cement from the works at Todd Inlet to Vancouver. The vessel, which is expected to arrive here in July next, is of 950 tons deadweight capacity and 400 tons register.

The Carpenters' Union at Montreal has asked the contractors for a three-year contract from May 1, 1912, at 40, 42½ and 45 cents per hour. The present rate of pay is 35 cents an hour. The demand for a new scale is accompanied by a demand for an eight-hour day.

It is reported from Quebec that the Canadian Pacific Railway has sumitted plans for the enlargement of the Palace Station grounds and the re-arrangement of the terminals. The object is to get an exchange of properties so as to obtain a straighter run into the city.

Excavation has commenced on the large apartment building at the northeast corner of Grosvenor street and Surrey Place, Toronto, which will be erected by Mr. R. H. Bullen, contractor, according to plans prepared by Messrs. Mallory & Thatcher. The building will be of reinforced concrete construction, fireproof throughout, and will cost approximately $350,000.

Mr. E. L. Cousins, Engineer of the Toronto Harbor Commission, will be a member of the Canadian deputation which will attend a meeting at Washington. convened by the United States Secretary of War to consider the effect of the proposed enlargement of the Chicago Drainage Canal on the levels of the lakes.

The statement has been made on good authority that the Jenckes Machinery Company of Quebec intend to establish a branch factory in Vancouver within the year and that the company will be prepared to handle a very large business. All kinds of machinery will be manufactured and a large staff of men employed.

An action for $10,500 has been entered against the Montreal Star Publishing Company by Mr. Joseph Bourque, contractor, who alleges that he was libelled by that paper in connection with an article on plaintiff's work on the Post Office contract. It was asserted that there had been undue delay on the part of the contractor.

In our review of general catalogue No. 11 of the Luitwieler Pumping Engine Company, published on page 64 of our issue of March 13, we omitted to state that the Canadian representatives of this firm are The General Machinery Company, Limited, 526 Traders Bank Building, Toronto, who are prepared to furnish full information relating to the Luitwieler system of non-pulsating pumping machinery.

Final reports upon the project of improving and deepening the Welland Canal have been submitted to the Hon. Frank Cochrane, Minister of Railways and Canals. The total estimated cost is $45,000,000. It is stated that the present canal will be deepened from 14 to 25 feet in the stretches and 30 feet in the locks, and will be widened from 150 to 200 feet. The new section will be of smaller dimensions. The plan provides for the widening and deepening of the canal from Port Colborne to a point a short distance north of Thorold.

The Contract Record had the pleasure of a visit last week from Mr. T. A. Tresidder, Montreal, of the Canadian Norcross Bros. Company. This firm has a number of important contracts in hand. Of these may be mentioned the Bank of Montreal and the Royal Bank at Winnipeg, the Bank of Toronto at Toronto, the granite work for the Ritz-Carlton Hotel, Montreal, and also for the Fort Garry Hotel of the G.T.P. at Winnipeg. A noteworthy contract was the furnishing of the cut marble monoliths for the Montreal Art Museum. The latter work was executed at the Iberville plant of the Norcross Company.

At the second annual convention of the Alberta Builders' Exchanges, held recently in Lethbridge, Mr. C. C. Batson, of Edmonton, was elected president, and Mr. J. H. Trimble, of Medicine Hat, first vice-president. The directors are Messrs. H. J. Goode. Lethbridge; R. A. Brocklebank, Calgary; J. H. Preston, Medicine Hat, and Thos. Culver, Edmonton. The special committee appointed to meet the representatives of the Alberta Association of Architects and to draw up a uniform form of contract reported a successful issue. In future the Alberta Contract Form will be used exclusively throughout the province.

Increased business in the sale of J-M Asbestos, magnesia and electrical supplies, throughout the territory covered by the Canadian H. W. Johns-Manville Company, Limited, at Winnipeg, has necessitated a move from their old quarters at 320 Main street, to 89 Princess street. The new building, shown in the accompanying illustration, will enable a much larger stock of goods to be carried on hand than heretofore. Mr. M. C. Burgess, who has been a resident of Winnipeg for many years, and who is well and favorably known in that section, has charge of this office.

The Highways of British Columbia

Mr. W. W. Foster, Deputy Minister of Public Works for the Province of British Columbia, recently delivered before the Progress Club of Vancouver a highly instructive address on the "Highways of British Columbia," which proved a revelation as to the magnitude of the road building undertakings of the provincial government.

At the outset Mr. Foster gave an idea of the thoroughness with which the construction of roads in British Columbia has been taken up in recent years, and particularly in the last year. During the past ten years the government of the province has expended on the construction of roads about three million dollars. As an indication of the interest in road construction at the present time, provision has been made this year for the expenditure of nearly half as much as the total for the previous ten years,—five million dollars—the completion of the roads intended for this season adding an addition of about 700 miles to the roads of the province. This work is included in the programme laid out by the provincial government, and will be supplemented by additional work provided through aid extended by the Dominion government.

In regard to the grants for road construction from the Dominion government, Mr. Foster stated that it would not be fair to this province to have the appropriation fixed on a certain population basis, for British Columbia had only a population of about 400,000, or about one person to the square mile. British Columbia presented features and difficulties which no other province contains and the work of improving the highways was confronted with one great obstacle at the start, that of arriving at, and carrying out a broad gauged plan, which would fit in with the different requirements which the different topographical and climatic divisions included within the boundaries demanded.

The requirements of the city needed to be met, the plain and the mountains, parts of extreme heat and cold in the various seasons, and at the different altitudes and parts of heavy rainfall and others of extreme aridity. Construction materials, and a host of other details had to be worked out to design a standardization which would be adapted to all the various conditions and permit of the work being carried out by one department to the fullest measure of success.

In some places the materials for road construction were in abundance and of excellent quality, and in others the right material was not at hand, and these conditions often entailed transport matters which presented engineering obstacles sometimes as difficult as the actual construction itself.

As an instance of these diverse conditions, he mentioned getting in the materials in some places by traction engines, while in the northern sections they had found that the most economical means was by the primitive method of dog team in the winter. Good roads meant the reduction of the price of hauling materials, farm produce or merchandise, and Mr. Foster quoted figures to show that the kind of roads the provincial government was interested in laying would bring down the cost to the vehicular traffic from 30 cents per ton per mile to 8 and 10 cents. The maintenance of the roads was another matter that had been receiving a good deal of consideration.

Regarding the interprovincial highway, which is an enterprise of great commercial advantage and utility, he described its course passing through the beautiful scenic parts of the Rockies. British Columbia will be the first to have its portion of the interprovincial road completed, although this province has more to contend with in the way of natural difficulties than any of the other provinces.

Mr. Foster concluded his remarks by praising the splendid roads possessed by Point Grey, adding that when the Marine Drive was completed it would be unequalled as a driveway in America.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brandon, Man.

[illegible] thousand feet of granolithic sidewalks will be constructed this year at a cost of $10,000. R. E. Speakman, [illegible]

Calgary, Alta.

A by-law will be submitted to provide catch basin extensions and connections for sewers. Cost $20,000.

Halifax, N.S.

The Board of Works is contemplating road construction to cost $30,000. Engineer, F. W. W. Doane, City Hall, Halifax. This work includes the moving back and reconstruction of 12 buildings to make room for double tracking of the train line.

Hamilton, Ont.

Tenders are called for waterworks extensions. Laying 48-in. steel intake, 2200 ft. into lake from beech, with gatehouse, crib, piling, etc. Laying steel and concrete conduit from Beach pumping house to filtering basins, with gate house, piling, manholes, etc. Tendering forms supplied by engineer sent registered to S. H. Kent, city clerk. addressed to Mayor. Mayor, Geo. H. Lees; Engineer, A. F. Macallum.

The following local improvements are authorized: Construction of cement walks and curbs on Cheever and Francis streets; pipe sewers on Fairholt rd. and Mayflower ave., King street east., Brant street, Dunsmure, road and Vine street. Work to be done by day labor. Tenders will be called shortly.

Nanaimo, B.C.

Engineer A. Waters recommends replacing 12-in. water main with 18-in. steel main 6000 ft., also pipes and valves. Cost $19,000.

Tenders are called for construction of 16,000 sq. yds. of concrete walks. Cost $47,000. Engineer. A. Waters.

Sandwich East Township, Ont.

Tenders are called for concrete pavement, two miles. Received by Engineer, specifications obtained therefrom. Close April 8th, 1912. Engineer, Owen McKay, Walkerville, Ont.

Sudbury, Ont.

Tenders are called until April 17th for sewage works: Contract A—Main sewer, 8,555 ft., 20-in .1,8-in.. 15-in. Contract B—Sanitary sewers and force main. Contract S—Sewer pipes and junctions. Plans and specifications at town clerk's office or at engineer's office, Mail Bldg., Toronto. No tender necessarily accepted. Mayor, J. T. Henry; Engineers, Chipman & Power, Toronto; Town Clerk, Geo. Elliott.

St. Thomas, Ont.

Tenders are called for cement walks and curbs. Engineer, M. H. Baker. Specifications may be seen at Engineer's office.

Toronto, Ont.

The extension of Gough ave., southerly, to connect with Harcourt ave. at a width of 50 feet has been recommended. W. A. Littlejohn, Clerk.

Walkerville, Ont.

Tenders are called for concrete pavement to cost $5,000. Received by City Engineer until April 8, 1912, for pavement on river front road.

CONTRACTS AWARDED

Regina, Sask.

Contract is awarded for extension to trunk sewer pipe to cost $22,079. Commissioner, A. J. McPherson. Address the Mayor.

Windsor, Ont.

Contract is let for new sewers on Pelissier and Dougall avenues, and Victoria street.—Jno. Reid of Sandwich, Ont. Paving on Hall and Mov streets —C. W. Caldwell, of Windsor, Ont.

Railroads, Bridges and Wharves

Calgary, Alta.

A by-law will be submitted to the ratepayers to provide for the extension to underground conduit system.

Fort William, Ont.

The Grand Trunk Pacific Railway are calling tenders for the construction of a frame bunk house to cost $20,000.

Fredericton, N.B.

Tenders will be called for construction of 3 miles of railroad for Gibson & Minto Railway Co. President, Sir Thomas Tait. Engineer, D. J. Maxwell.

Galt, Ont.

A site has been purchased for station, cost $100,000, for Canadian Pacific Railway Company, Union Station, Toronto. 290 x 40, brick, concrete foundation.

Leaside Junction, Ont.

A site has been purchased for new freight yards and terminals for Canadian Pacific Railway, Union Station. The present engine shops at Union Station will be moved here.

Nanaimo, B.C.

Plans are in preparation for 3 span bridge to cost $30,000; 45 ft. long, 40 ft. wide. across tidal inlet. Address A. G. Waters.

Ottawa, Ont.

The Ottawa Electric Railway Co. have been granted permission to lay tracks on Wellington street at a cost of $32,000.

Parish of Coverdale, Albert Co., N.B.

Tenders are called for re-construction of Fillamore Hill bridge. Received by H. M. Blair, secretary until April 8, 1912. Dept. of Public Works, Fredericton, N. B.

Pt. Colborne, Ont.

Niagara, St. Catharines & Toronto Ry. Co. have applied to Minister of Railways & Canals for permission to bridge the Welland Canal for road from Pt. Colborne to Ft. Erie.

St. John Harbor, N.B.

Tenders are called for dredging to include towing of plant to and from work. Dredges used must be registered in Canada at time of filing of tender. Contractors to start within 30 days from notice of acceptance. Tenders to be accompanied by certified cheque of 10 per cent. of tender price, forfeitable on refusal to do work. otherwise will be returned to unsuccessful bidder. Tenders to be made on forms supplied; these may be had on application to secretary; also plans and specifications. Dept. of Public Works, Ottawa. R. C. Desrochers, Secretary.

Ste. Luce, Rimouski County, Que.

Tenders are called for construction of wharf. Dept. of Public Works, Ottawa, Ont.; secretary, R. C. Desrochers. Plans, etc., at Public Works Dept., Ottawa, and at the offices of A. R. Decary, dis. eng., Quebec, J. L. Michaud, dis. eng., Merchants Bank Bldg., Montreal, and on application to local postmaster. Received by secretary until April 9, 1912.

St. Thomas, Ont.

London & Lake Erie Trans. Co. will erect new car barns on site of old Hutchinson house to cost $10,000.

Shelburne, Ont.

Plans have been prepared for new C. P.R. station on Main street. Material is being placed and interior fittings are required.

Toronto, Ont.

Tenders are open until April 23rd for concrete abutments, Malton Bridge over Mimico Creek, Cockburn Bridge near the Humber and N. Woodbridge bridge. Engineer, F. Barber, 57 Adelaide E.

Tracadie, Newcastle, N.B.

A railway construction company is to be incorporated. The aid of Prov. Government will be asked by W. L. Allain, who will also introduce bill for 55 miles of railway.

CONTRACTS AWARDED

Jock River, Ont.

Bridge, cost $11,000, near Fallowfield, Carleton Co., for Canadian Northern Railway Company. Engineer, J. A. Parks, Sunnyside avenue, Ottawa. Contractor, J. E. Askwith, Alescarder street, Ottawa. Steel and concrete.

Public Buildings, Churches, Schools, etc.

Arthur, Ont.
Secretary T. E. Langford of Public Library Board has been offered a free site on Union street for the erection of a new building to cost $7,500.

Bay View, N.S.
Tenders will be received until April 30th for the erection of a Lifeboat House and dwelling combined. Plans and specifications &c. at Dept. of Marine & Fisheries, Ottawa, A. Johnston, Deputy Minister, Ottawa, and at Post offices Digby, Annapolis, Yarmouth, Weymouth and Westport.

Calgary, Alta.
A by-law will be submitted to provide $12,000 for addition to city stables.

Dundas, Ont.
Dominion Government, Ottawa, purpose building additions to post office here. Architect, A. W. Peene, 2 King street W. Hamilton, Ont. Supplementary estimates provide for $20,000 for this work.

Fredericton, N.B.
Tenders are called for hose station to cost $14,000. Chairman, Ald. Cruickshanks, Chm. Fire Committee. The building will be of brick construction.

Harriston, Ont.
Tenders are called for P. O. fittings. Dept. of Works. Ottawa; Sec., R. C. Desrochers. Plans and specifications to be had on application to Geo. Grey, architect, Harriston. T. A. Hastings, Postal Station F., Toronto, or Dept. of Public Works, Ottawa. Marked cheques of 10 per cent. to accompany tender.

London, Ont.
Plans are being prepared for school to cost $70,000. Architect, Mr. Nutter (City Architect); 10-room school in South London, large addition to Aberdeen school. Heating system, seats, interior furnishings required. Chairman, J. M. Gunn, London.

Meaford, Ont.
Plans are prepared for armouries, cost $8,000, Two storeys, 80 x 118, stone and concrete foundation, brick, iron roofing.

Montreal, Que.
The Westmount A. A. Association are considering the sale of their athletic field and using proceeds to build a new club house near Westmount Park.

Mt. Forest, Ont.
A site has been donated for public library to cost $10,000. Masonry conditions for Carnegie fund have passed the council. R. O. Kilgour, sec. Library Board.

North Toronto, Ont.
The Board of Education are considering the selection of a site for the erection of a new school.

Nanaimo, B.C.
Plans are being prepared for school to cost $35,000. Architect, City Engineer. 2½ storeys, 70 x 70, concrete foundation, brick, hot water, electric lighting, shingle roof, metallic lath, metal ceiling, asbestos materials, steel beams, fire escapes, prismatic glass.

Ottawa, Ont.
P. Labelle, 90 Church street, is contemplating the erection of a Vaudeville Opera House, cor Dalhousie and York streets. 60 x 136.

Plans have been completed for additions to Y.W.C.A. building. Solid brick. swimming pool, gymnasium, domestic science room, 21 bed rooms, baths, etc. Architect, J. A. Ewart, Sparks street, Ottawa.

Plans have been accepted for church to cost $90,000, Cooper and Connor sts., for Bank Street Presbyterians. Architects, Hutchison, Wood & Miller, 50 Royal Insurance Building, Montreal.

Tenders are called until April 9th for fuel testing building (alterations), for Dom. Govt., Dept. of Public Works. Architect, D. Ewart, West Block. Construction 2 and 3 storeys, 75 k 45, concrete foundation, solid brick, steel roof trusses, limestone window sills, galvanized iron cornices, birch flooring, electric lighting, hot water heating, slate roof, 3 testing vaults.

Plans have been prepared for drill hall to cost $200,000 for Dominion Government. Minister of Militia, Col. Sam. Hughes.

Regina, Sask.
It is proposed to erect an Anglican Cathedral here. Architects, Mr. Cram, consulting, and Mr. Brown, local architect. Building Committee, J. F. L. Embury, barrister; Malcolm Ross, Civic Parks Superintendent, and Rev. Mr. Calder, St. Chad's Hospital, Regina, Sask.

Ste. Felicite, Que.
Tenders are called for construction of isolated block. Plans, etc., at office of A. E. Decary, Dis. Eng., Quebec; J. L. Michaud, Dis. Eng., Merchants Bank Bldg., St. James street, Montreal, Que., or on application to local postmaster. Received by secretary until April 10, 1912. Public Works Dept., Ottawa; Sec., R. C. Desrochers.

St. Ulric, Que.
Plans are being prepared for addition to R. C. Church to cost $25,000. Stone construction, galvanized iron roof, cut stone work, brick work, structural steel, sheet metal work, pipe covering, deafening paper.

Shelburne, Ont.
Work has started on the removal of the old church and a new church will be built, plans for which are prepared by architect, Mr. Foster, Owen Sound. 1-storey and basement, stone front, brick walls, stone foundation, electric lighting, slate or shingle roof, Cathedral glass.

Stratford, Ont.
Plans are prepared for Salvation Army Barracks. Secretary. J. A. Fletcher. Architect, Major Miller, Toronto. 3-storey and basement, 63½ x 32 feet, concrete foundation, red and buff brick, stone trimmings, electric lighting, steam heating, seats and office equipment required.

Sydney, N.S.
Tenders will be called for erection of a rink, etc., on Main street, for H. T. Grant, A. N. McLennan, J. W. Publi cover. Work to commence this summer.

Toronto, Ont.
Dominion Government, Ottawa, are contemplating additions to Post Office Departments to cost $150,000. 1 storey to be added to present P. O. on Lombard street, $25,000. New station in east end, $50,000; new station vicinity of College and Spadina avenue, $50,000; new station at Davisville, $25,000.

Tenders are open until April 11th for Knox College, University and St. George street. Architect, Chapman & McGiffin, 59 Yonge street, Toronto.

Windsor, Ont.
J. M. Ward, c/o Avenue Theatre, Detroit, Mich., has secured property here as a site for the erection of a moving picture theatre to cost $20,000.

CONTRACTS AWARDED

Carp, Ont.
Church for Carp Methodist Church Board. Architect, Horwood, Taylor & Horwood, Sparks street, Ottawa. 39 x 53 ft., concrete foundation, solid brick. galvanized iron roof, hot air heating. brick veneer, circular seating, metal finish to basement ceiling. Sunday School room and pastor's study in basement. Contractor, R. J. MacKay, Ottawa.

Dorchester, Ont.
Anglican Church to cost $5,000. Contractors, Craig Bros., of Crampton. New organ, seating, furnaces, interior furnishings, electric lighting will be required.

Edmonton. Alta.
Moving picture theatre for Mallory & Thatcher, Queen street west, Toronto. Contractors: Interior woodwork, Cameron & Campbell. Ornamental plastering, W. J. Hynes, Toronto. Glass, Luxfer Prism Co.

London, Ont.
Contract is awarded for St. Michael's R. C. church, cor. Cheapside and Maitland streets, to Mr. Jno. Keyes, Stratford, Ont. Work will commence at once.

Montreal, Que.
Contract is awarded for moving picture theatre, 336-338 St. Catherine St. West, for G. W. Stephens Estate. Architect, H. C. Stone, 84 St. Francois Xavier street. Steel work, Dominion Bridge Company, Lachine; masonry & carpentry, Jno. Wighton, 73 Fort street. Remodelling of two stores into moving picture theatre.

Moving picture theatre, cost $15,000, 285 St. Catherines street, for J. E. & J. A. Labrecque, Trust & Loan Bldg. Architect, J. A. Godin, 269 St. Denis street, Montreal. General contractors, Mount Royal Construction Company, 62 James street, Montreal. Two storeys, 40 x 90

Club House on Drummond street and Stanley street, for Winter Clubs, Limited. Architect, E. & W. S. Maxwell, Beaver Hall Square. Montreal. Contractor, E. G. M. Cape, Beardmore Bldg. Three storeys and basement, [illegible] brick with sandstone trimmings.

Ottawa, Ont.
School to cost $21,000, Eastview, for Separate School Board. Architect, F. C. Sullivan, Sparks street, Ottawa. [illegible]

al contractor [illegible] & White, Eastview, Ottawa.

A permit has been granted for school to cost $15,000, Bayswater street, for Fathers (Pedorn Priest) Ottawa. Architect, [illegible] Pinley & Son, 19. Cathcart street. Solid brick, [illegible] x 41, stone foundation, electric lighting.

Following contracts are awarded for addition to school to cost $15,642 on Kent street, for Public School Board. Fans, etc.—Canadian Sirocco Company. Plumbing—[illegible] Brethours & Company, Ottawa. Brick and carpentry—Taylor & Lackey, Ottawa. Glazing—W. J. Carson, Bank street, Ottawa. Galvanized iron—Architectural Sheet Metal Co.

Regina, Sask.

Contract is awarded for public greenhouse to cost $3,000. Superntendent of Parks, Malcolm Ross. General contractor, E. Hancock, Regina. Carpenter, King Construction Co., Regina. Plumbing and heating, Paulin & Swayze, Regina.

Toronto, Ont.

Children's Shelter to cost $6,000, E.S. Simcoe near Queen, for Children's Aid Society, Simcoe street. Architect, J. W. Gray, Confederation Life Bldg. Builder, Burton & Chemells, 246 Albany ave. Two-storey and basement, brick, stone foundation, tar and gravel roofing, hot water heating, electric light, structural steel, art stone, tile.

Dominion Building to cost $100,000 for Canadian National Exhibition Association, Temple Bldg., Toronto. Architect, Geo. Gouinlock, Temple Bldg. Builder, Wickett Bros., Rose avenue, Toronto. Steel—Hamilton Bridge Co. Stone—Cement Products. Carpentry—Jas. McKenzie. Plumbing, Bennett & Wright. Galvanized iron—A. B. Ormsby. Steel sash—Henry Hope Co.

Weston, Ont.

Contract is awarded for Children's Building for National Sanitarium Association, Weston, Ont. Architect, Denison & Stephenson, Stair Bldg., Toronto. Steel, Dominion Foundry Co., Ltd. Roofing and sheet metal, A. B. Ormsby Co., Ltd.

Residences

Brandon, Man.

City council have been asked to make necessary sewer and water extensions for Robt. Kerr who is planning the erection of 40 frame and cement houses.

Burlington, Ont.

Plans are prepared for addition to stores for Mr. W. Kerns. Interior equipment will be required.

Calgary, Alta.

Plans are prepared for residence, cost $4,000, Elbow Park, for Architect and contractor, E. W. White, 330 15th ave. east. Two storeys, 37 x 43, concrete foundation, frame, hot air, electric lighting, shingle roofing.

Plans are ready for two residences, cost $6,000, Sunnyside, for M. A. Ethridge, 703 1st avenue, Calgary. Architect, Builder and owner. Two storeys, 32 x 40, concrete foundation, brick veneer, electric lighting, hot air heating, shingle roofing.

A permit has been granted for residence to cost $10,000, Mt. Royal, for H. D. Norton, 302 14th avenue west. 2-sty., 42 x 45, concrete foundation, frame, shingle roof, hardwood finish, hot water heating.

A permit has been granted to erect a residences to cost $5,000, Hillhurst street, for G. W. Rae, 1119 5th avenue west. 2-storey, 20 x 36, frame, concrete foundation, hot air heating, shingle roofing.

Plans are prepared for residence to cost $4,500 for Alliance Investment Co. 2-storey, 32 x 40, frame, concrete foundation. steam heating, electric lighting, hardwood finish.

Plans have been prepared for residence to cost $4,000 for H. E. Ridout, 1023 7th avenue west. 2-storey, 30 x 30, frame, steam heating, hardwood finish, concrete foundation, shingle roof.

Dundas, Ont.

Plans are in progress for 2 residences to cost $5,000 for Robert Karch. Brick. Required all interior furnishings, heating and lighting system.

Fredericton, N.B.

Mr. Ed. Moore is contemplating the erection of a residence to cost $3,000. Latest modern equipment in heating, plumbing, etc., required.

Montreal, Que.

Residence, cost $6,000, on Maine St., for J. Ladouceur, 198 Querbes street. Architect, J. A. Quellet, 860 St. Catherines street; contractor, M. Betournay, 672 Duchesne street. Three storeys, 25 x 88, brick and stone, concrete and masonry foundation, hot water heating, electric lighting, gravel roofing.

Excavating is done for six flats, cost $4,500, Masson street, for A. Lamarche, 1778 Iberville street. Contractor, owner. Two storeys, 51 x 28, brick, stone and concrete foundation, gas lighting, gravel roof.

Henry Goffrey, 13 St. John street, is excavating for 2 residences to cost $6,000 on Oxford avenue. 2-storey, 35 x 50, brick, concrete foundation, tar and gravel roofing.

J. B. Fellowes, 337 Wiseman avenue, is planning to erect 4 cottages to cost $20,000, Nelson street, (Outremont). Architect, E. W. Barnes, 2126 Mance st. 2-storey and basement, 24 x 45, solid brick, stone foundation, hot water htg., gravel roofing.

Excavation will start shortly on flats to cost $7,500, for Nap Carriers, 794 Clark street. 3-storey, 49 x 56, stone foundation, brick, hot water heating, gravel roof, gas and electric light.

Work will be started shortly on 3 flats to cost $4,000, Chapleau street, for Jas. Allard, 800 Frontenac street. 3-storey, 25 x 40, stone foundation, wood and brick, gravel roof, electric light.

Excavation is finished for 7 residences to cost $15,400, Charron street, for Chevalier & Frere, 767 Clark street. Architect, P. L. Dupre, 567 Delorimier. 3-storey, 16 x 40, pressed brick, concrete foundation, gravel roof, furnaces.

Work has started on cottage to cost $6,000, cor. Quebec and De l'Epec Sts., Outremont, for Mrs. T. A. Desy, 596 Sherbrooke street E. Stone foundation, solid brick, hot water, electric ltg., gravel roof.

Arthur Arcand, 150 Valois street, is erecting 20 flats, to cost $15,000, three storeys and basement, 100 x 40, red pressed brick, concrete foundation, gas lighting, gravel roof.

Ottawa, Ont.

Tenders are called for erection of a residence on Marlborough avenue, for Thos. A. Beamont, 281 Gilmour avenue. Architect, C. P. Meredith, 126 Sparks street. Three storeys, solid brick, electric lighting.

Plans are in progress for residence for H. McCurry, Hurdmans Bridge. Architect, W. E. Noffke, Central Chambers, Ottawa. 2½ storeys, 30 x 36, concrete foundation, brick and concrete, pitch roof, electric light.

Regina, Sask.

C. B. Keenleyside, Eastern Saskatchewan Land Co., is planning to erect apartments here this summer at a cost of $90,000.

Simcoe, Ont.

Plans are in preparation for residence to cost $8,000, for Crescent Height Land Co. Interior finishings, plumbing, heating and lighting equipment will be required.

Daniel McKnight will build a new residence: 2-storey, brick, stone foundation, slate and shingle roof, gas and electric lighting, gas heating. Cost about $8,000.

Toronto, Ont.

Apartment house, cost $12,000, rear 2339 Queen street east, for J. A. Carstairs, 2339 Queen street. Architect, F. R. Berry, 1107 College street, Toronto. Builder, Orr Bros., Limited, 39 Queen street east. Two storeys, brick, tar and gravel roofing.

Tenders are open for eight detached residences, cost $12,000, for M. Ridout, 12 Ashland avenue. Roughcast and brick front.

Plans are in progress for dwelling, cost $5,000, Balsam ave., for T. Hartwick, 90 Waverly road. Architect, C. L. Stewart, 20 Bay street. 2½ storeys, brick, stone foundation, structural steel, marble, mantles, tiles, hardwood finish, stucco, reinforced floors, plate and art glass, slate roofing.

Tenders are open for five dwellings, cost $12,500, on Cooper avenue, for M. Sheinkman, 30 Kensington Place. Brick tar and gravel roofing.

Plans are in progress for pair dwellings, cost $5,000, Logan & Garnock ave., for G. A. Grant, 681 Logan avenue. Contractor, P. H. Finney, 43 Victoria street, Toronto. 2½ storeys, brick, semi-det. tar and gravel roofing.

Plans have been drawn for residence, cost $3,500, E.S. Fuller street, south of Queen, for D. McLean, 34 Fuller ave. Two storeys, brick.

Plans are in progress for residence, Ridley Gardens, for McConnell & Boadway, 12 Fuller street. Architect, J. M. Cowan, 65 Adelaide street east. Two storeys, brick, shingle gambrel roof.

Tenders are open for pair residences to cost $5,000, Conduit street, for Garfunkel & Bordman, 727 Richmond street west, Toronto. Architect, J. H. Galloway, 23 Toronto street, Toronto. 2-storey and attic. semi-detached, brick, shingle roofing.

Tenders are open for 4 suite apartment houses to cost $7,500, Indian road and Constance street, for Misses Sanderson, 405 Spadina avenue. Architect, J. H. Stanford, 17 Westmoreland ave. 2½-storey, brick. structural steel, cut stone, mantles, tiles, hardwood finish, plate and art glass, slate roofing.

Tenders are open for twelve detached residences, cost $18,000, E.S. Morley ave. for M. Ridout, 12 Ashland ave. Rougcast and brick front.

Plans are completed for residence to cost $6,000, Oakwood and Rosemount road, for F. Waite, 174 Sheridan avenue. Architect, W. J. Thompson, 692 Bloor. 2½-storey, tar and gravel roofing.

Tenders are open for residence to cost $7,000, 29-31 Farnham avenue, for A. E. Armstrong, 61 Farnham avenue. Architect, C. M. Willmott, 205 Yonge street. Builder is owner. 2½-storeys, brick, shingle roof.

Tenders are open for 4 pair dwellings to cost $18,000, Bloomfield avenue, for W. W. Hiltz, 682 Broadview avenue, 2-storey and attic, semi-detached, brick, tar and gravel roofing.

Plans are in progress for detached house to cost $3,000, Pretoria and Cambridge, for R. Jeffrey, 14 Withrow ave.. Toronto. Architect, P. H. Finey, 43 Victoria street, Toronto. Brick, shingle roofing, cut stone, mantles, tiles, hardwood finish, plate and art glass.

Tenders are open for pair dwellings to cost $6,000, Sumach street, near Carleton, for Thos. Cruttendon, 658 Broadview avenue. 2½-storey, brick, tar and gravel roofing.

Tenders are open for pair dwellings to cost $5,000, Hillside avenue, for Rev. J. A. McKenzie, Shelburne, Ont. 2½-storey, semi-detached, brick, tar and gravel roofing.

Tenders are open for 2 pair residences to cost $9,000, 238 Withrow avenue, for Wm. Hiltz, 682 Broadview avenue. 2-storey and attic, semi-detached, brick, tar and gravel roofing.

Plans are completed for dwelling to cost $5,000, Westminster street, for A. A. Paterson, 9 Indian Grove. Architect, J. A. Harvey, Manning Chamber. 2½-storey, brick, detached, hot water heating, combination lighting, cut stone, marble, mantles, tiles, hardwood finish, plate and art glass, shingle roofing.

Tenders are open for pair dwellings to cost $6,000, S.E. cor. Oak and Sumach street, for F. Thornton, 114 River street. Architect, P. H. Finney, 43 Victoria street. Semi-detached, brick, tar and gravel roofing.

Winnipeg, Man.

Residence on McDermott ave., for Robert Wood. Architect, Ed. Prain. Contractor, Daykin Scott Construction Company, 253 Princess street, Two storeys, 27 x 29, brick veneer, stone foundation, hot water heating, electric lighting, shingle roofing, maple floors.

Tenders are open for detached residence to cost $3,000, 26 Edna avenue, for Wm. Cheyne, 39 Riverside avenue. Architect, W. Anderson. Builder is owner. 2½-storey, brick, shingle.

Plans are in progress for alterations to dwellings to cost $3,500, 1434 Queen W., for S. Hobbs, 1434 Queen street W. Architect, Jas. Ingham, 22 Leopold st. Brick and plaster.

Plans are in progress for 1 detached and one pair semi-detached residences to cost $7,500 on W.S. Pape avenue, for W. Rowles, 268 Pape avenue. Architect, J. Keller, 4 Hazelwood avenue. Shingle and tar roofing, hot air heating, electric lighting.

Tenders are open for detached residence to cost $3,500, Palmerston avenue, for Caplin Bros. & Layvesky, 237 Augusta avenue. Architect. J. G. Hedges. Tenders received by owner.

Tenders are open for residence to cost $3,000, Carling avenue, for Geo. Hayward, 501 Ossington ave. Architect, William Snowden Thompson. Bloor and Clinton streets. Shingle roofing.

Tenders are open for 2 detached residences to cost $7,000, E.S. Oakwood, south of Burlington Crescent, for Geo. E. Case, 296 Indian road. Architect, A. D. Lee, 301 Roncesvalles. 2-storey and attic, stone and brick, tar and gravel roofing, hot air heating, art stone, mantles and tiles, hardwood floors.

Plans are in progress for pair dwellings to cost $5,000, 36 Arlington ave., for Mr. T. Jones, Christie street, Tononto. Architect, G. Chessell, 117 Chester avenue. Brick front and roughcast sides, tar and gravel roofing.

Tenders are open for residence to cost $3.600 on Beach avenue, for Jno. Break, Kingston road. Architect, J. G. Hedges, 34 Yonge street. Brick, shingle, hot water heating. combination ltg.

Tenders are open for apartments to cost $8,500, St. Joseph and Grenville streets, for J. H. Young, 46 Grenville street. Architect, Mallory & Thather, 31 Queen street. 2-storey, brick and frame. tar and gravel roofing, structural steel, art stone, mantles, hardwood finish, concrete, plastic relief work, plate and art glass.

Tenders are open for 4 houses to cost $10,000, 184-8 Seaton street, for J. Taylor, 182 Seaton street. 2½-storey, brick, tar and gravel roofing, hot water, combined lighting, art stone.

Plans are drawn for detached dwelling to cost $3,000, Rainsford road, for E. M. Butte, 860 Manning avenue, Toronto. Architect, E. Churchill. 2-storey, brick. Owner is builder.

Tenders are open for pair residences to cost $5,500, Annette street, for Sam Solodinsky, 2122 Dundas street. 2½-storey, hot air heating, tar and gravel roofing.

Plans are completed for detached residence to cost $3,000, Ridley Gardens and Garden avenue, for H. J. Gledhill, 294 Queen street west. Architect. P. H. Finney, 43 Victoria street. 2½-storey, brick, shingle roofing.

Vancouver, B.C.

Plans have been prepared for apartment house to cost [illegible], Granville street, for A. C. McNeill. Architects, J. P. Matheson & Son, 522 Granville street, Vancouver. Four-storey, 25 x 120, brick, mill construction, concrete basement, exterior finishing terra cotta and brick burlap. Plans call for oil burning heating plant, plaster block wall partitions.

Winnipeg, Man.

Plans are being prepared for residence for J. A. McCormack. Architect, [illegible] Prain. [illegible] storey, [illegible], brick, stone foundation, hot water heating, electric lighting, shingle roof, hardwood floors.

Plans are being prepared for residence on Harbinson avenue for Geo. Aikman. Architect, Ed. Prain. Two storeys, 24 x 26, frame, stone foundation, hot water heating, electric lighting, shingle roof, hardwood floors.

Plans are being prepared for apartments to cost $30,000, Jessa and Ainsley streets, for H. Peterson. Architect, E. W. Crayston, 572 Ross avenue, Winnipeg. 3-storey and basement, 46 x 108, 6 ft. stone wall above ground level, stone foundation, red brick and stone, felt and gravel roof, steam heating, electric ltg., fir and maple floors.

Tenders are called for residence to cost $5,000, on Machray avenue, for A. Beck, 515 Selkirk avenue. Architect, E. W. Crayston, 572 Ross avenue. 2-sty., and attic, 30 x 32, stone foundation, brick and stone, electric light, hot water heating, shingle roof, fir interior finish.

Apartments to cost $75,000, Clark st., for S. D. Richardson, St. James street. 3-storey and basement, 70 x 110, stone foundation, red brick and stone, oak and maple floors, steam heating, electric lighting, fire escapes, boilers and steel balconies.

West Toronto, Ont.

Plans are in progress for residence to cost $2,800, Evelyn avenue, for H. C. Card, 263 Evelyn avenue. Architect, W. Milliship, West Toronto. 2½-storey, brick, shingle roofing.

CONTRACTS AWARDED

Bridgeburg, Ont.

Residence to cost $3,000, for Dr. Geo. French, Bridgeburg. 2½-storey, concrete foundation. brick, shingle roof, steam heating, electric light, hardwood floors. Contractor, Davis & Ransom, Bridgeburg; including excavation, masonry, carpentry, painting and glazing, plumbing, heating, roofing.

Calgary, Alta.

Plans are ready for two residences, cost $6,000, for Jas. Boyle. Contractor, Johnson Bros., McTavish Block, Calgary. Two storeys, 27 x 41, frame, concrete foundation, steam heating, electric lighting, shingle roofing.

Grimsby, Ont.

Residence to cost $5,000, for Frank B. Macklem. Contractor, Mr. Hill, Grimsby. Concrete foundation, brick and stucco.

Hamilton, Ont.

A permit has been granted for residence to cost $3,500, 217 Caroline street S., for J. A. C. Morrow, 215 Caroline street S. Masonry and carpentering, Wm. Henry, 112 Locke street N. Plastering, Rok Dow, 15 Bay street N.

Three houses to cost $9,000, Sherman avenue, for Alanson Moote, 23 Tisdale street. Carpentry, A. Moote, 23 Tisdale street. Masonry, M. Isbister, 25 Wellington street. Plumbing and heating, Staunton & Mitchell, 173 York street, Hamilton.

Montreal, Que.

Excavation has started for two flats, cost $4,000, Melrose avenue, for C. Gillard, Wilton avenue. Contractor, S. Whitaker, 285 Hampton avenue. Two storeys, 25 x 62, concrete foundation, brick veneer, electric lighting, tar and gravel roof, furnace.

Foundation is in for 5 flats, cost $3,500, for A. Seguin, 162 Victoria street. Owner is contractor. Three storeys, 25 x [illegible] concrete foundation, brick and wood, gas lighting, tar and gravel rfg.

[illegible] cost $12,000, Papineau ave., for Alf. [illegible], [illegible] Mount Royal ave. east. Architect, Arthur St. Louis, 80 St. Gabriel street. General contractor, H. L. [illegible], 1475 Papineau avenue, Montreal.

Excavation is done for six flats, cost $5,000, St. Dominique street, for E. Laurin, 2087 St. Urbain street. Contractor, A. Bouchard, 91 Suzanne street. 3 [illegible] x 47, brick, stone foundation, stoves, electric lighting, gravel roofing.

Three residences on Dorchester street for Henry Upton, 227 Notre Dame st. west. Contractor: masonry and brick work, W. M. Irving, Guy Block, St. Catherine street west. Two storeys and basement, 76 x 120, pressed brick, sandstone trimmings, hot water, electric light.

Excavation is begun for residence and studio to cost $5,000, 2100 Park avenue, for Mrs. Jas. Perrault, 2106 Park ave. Architect, Joseph Perrault, 2106 Park avenue. General contractor, Eugene Lessard, 1630 Cadieux street. 3-storey, 19 x 64, brick and Roman stone, masonry foundation, metallic roof, hot water heating, electric light, terra cotta floors, dumb waiter.

Residence on Sussex avenue for Mrs. H. B. Mathews, Sussex avenue. Contractor, R. E. Edwards & Son, 200 Versailles street. Plumbing, J. A. Gordon, 301 St. Antoine street, Montreal.

Ottawa, Ont.

Plans are prepared for apartments to cost $32,000, Gloucester street, for E. R. Menue. Architect, A. L. Weeks, Sparks street. General contractor, W. G. Adamson, 126 Sparks street, Ottawa. 48 x 94; old building to be torn down.

Apartments to cost $6,000 on Emmett street, for Mrs. Mary Clark, Ottawa. General contractor, J. R. Howe, 324 Mutchmore street, Ottawa, 29 x 38, concrete foundation, brick, new roof.

Outremont, Que.

Foundation has started for cottage and garage to cost $10,000, Outremont avenue, for L. Latourelle, 6 Craig street west. General contractor, F. A. Grottie, 6 Cuthbert street. 2-storey, 50 x 37, stone foundation, solid brick, hot water heating, gravel roofing, electric lighting.

Regina, Sask.

Extension to apartments to cost $50,000. Contractor, Henry Black. 3-sty., 150 x 80, fireproof construction, concrete foundation, steam heating, electric light, fire escapes.

Saskatoon, Sask.

A permit has been granted to erect 2 residences at a cost of $4,500 each for F. E. Farley, Saskatoon. Contractor, F. E. Farley, Saskatoon. 2-storey, frame, concrete foundation, steam heating, electric light.

Toronto, Ont.

Contract is let for dwelling, cost $5,000, on Keele street, for J. P. Kelly, 1 Alhambra avenue. Architect, Fletcher W. Sheppard, 974 Shaw street. Two storeys and attic, brick, stone foundation. Owner is builder.

Pair residences to cost $6,200, 98 Massey street, for Wm. Daniels, 98 Massey street. Architect, J. Shuttleworth. Builder, J. M. Cummings. 2½-storey, brick, semi-detached, stone foundation, shingle roofing, hot air heating, electric light.

Althena Apartments to cost $350,000, Queens Park, for A. H. Bullen. Architect, Mallory & Thatcher, Toronto. Contractor is owner. 4-storey and basement, frontage 150 ft., wings 140 ft., reinforced concrete and tile floors, brick, 85 suites, billiard room, bowling alley and swimming bath.

Alterations to residence to cost $12,000, Avenue road, for McCormick Estate, Avenue road and Alcorn avenue. Architect, Gordon & Helliwell, 12 Richmond E. Builder, Witchall & Son, 163 Havelock street. 2½-storey, brick, stone foundation, hot water heating, cut stone, hardwood floors, concrete floors, refrigerators.

Apartment house to cost $18,000 on Church street, for L. Goldman, 176 St. George. Architect, J. M. Cowan, 65 Adelaide E. Masonry, Elgie & Page. Heating, P. J. Hayes.

Windsor, Ont.

A permit has been granted for 12 residences to cost $24,000, Elm avenue, for Osterhour & Little, 201 Goyeau street. Contractors are owners. 2-storey, brick and frame.

Yarmouth Centre, Ont.

Residence to cost $3,000, for H. Huntley, Yarmouth Centre. Architect, A. Morris, St. Thomas. 2-storey, 30 x 40, brick veneer, concrete foundation, hot air heating, slate roof, hardwood floor. General contractor, A. Morris, St. Thomas. Mason, Jas. Belkin.

Business Buildings and Industrial Plants

Bassano, Alta.

Mayor Whitney is planning to erect a business block on 35th street east and 2nd avenue. Two storeys, solid brick, 100 x 150, modern in every detail.

Calgary, Alta.

J. W. Chuttick, 815 18th avenue W., has applied for permit to erect store and apartments at a cost of $12,000. 2-sty., 62 x 49, brick veneer, steam heating, ordinary finish.

Work will start shortly on departmental store to cost $1,500,000, for Hudson Bay Co. 8-storey, 24½ x 130, fireproof construction, concrete foundation, steam heating, electric boilers, engines, dynamos, switchboard, storage batteries, vacuum cleaners, pneumatic tubs, sprinklers.

Dundas, Ont.

R. Storey & J. Mart have premises under consideration and work to start soon as site is decided on the erection of a vest factory.

Edmonton, Alta.

Excavation tenders are being called for warehouse to cost $300,000, 4th and Athabasca, for Revellon Bros. Excavation of 6,000 yds. of earth for basement. A New York company are supposed to have the general contract.

Galt, Ont.

Tenders will be called for Bank and offices for Bank of Toronto. Architect, C. F. Martin, Toronto. 2-storey, 58 x 35, stone foundation, terra cotta facing, tile floors and hardwood finish, vault and safety deposit boxes.

Hamilton, Ont.

Dairy building, cost $7,000, Vine street, for Hamilton Dairy Company. President, D. C. Flatt, Somerhill Stock Farm, Millgrove, Ont. General contractor, G. F. Webb, 136 Stinson street. One storey and basement, 90 x 42. Machinery contract to a Chicago firm.

Robinson & Findlay are planning additions to Hotel Dominion, 80-82 King west, at a cost of $10,000.

Proprietors M. Neil & Hugh McGoldrich are contemplating alterations to the Court House Hotel, 61 John street S., at a cost of $3,000.

William Candon is having plans prepared for remodelling the Stockyards Hotel at a cost of $7.000.

London, Ont.

J. H. Chapman has had plans prepared by architect H. C. McBride, 501 Colborne street, for stores, Baker and Dundas streets, to be remodelled into one large store. Required, complete new equipment, gas and electric fixtures, steam heating, cash carriers, counters, show-cases, &c.

Midland, Ont.

Benson & Bray plan to build new factory to make sash, doors, flooring, trim, etc., 2-storey, 165 x 70, slow burning, sprinkler system, dry kiln 20 x 52, stock shed 48 x 116, 2-storey, frame and sheet iron, 300 h.p. engine has been purchased. Exhaust steam heating for factory and kiln. Vote on by-law to loan company $25,000 will be taken on April 12th. Estimated cost $50,000.

Montreal, Que.

Oxford Hotel Co. are having plans prepared by Architect D. J. Crighton, Jacob Bldg., Montreal, for alterations to the hotel on University street. Terra cotta front, new grill room and cigar salesroom. Tenders will be called shortly.

Tenders are called for office building on Lagauchetiere street, for Desbarats Printing Co., Ltd., 23 Beaver Hall Hill, Montreal. Architect, Brown & Vallance, St. James street, Montreal. 10-storey, all modern conveniences.

Ottawa, Ont.

J. McMillan & Co., jewellers, Sparks street, have plans prepared by Architect W. E. Noffke, Central Chambers, for alterations and additions to their store.

Plans are prepared for garage, Slater street, for Wylie Ltd., Albert street, Ottawa. Architect, A. L. Weeks, Sparks street, Ottawa. Three storeys, 57 x 157, concrete foundation, brick and reinforced concrete, electric lighting, tar and gravel roofing.

Plans are being prepared for alterations to shop, for Geo. Mathews & Laing Co. Architect, W. E. Noffke, Central Chambers, Ottawa.

P. Labelle, 90 Church street, will convert York street residence into garage, 45 x 85, to be faced with Ohio sandstone, and fireproof. Cost $5,000.

Jackson Booth has purchased the Bank street Presbyterian Church property and will erect office building on the site soon as vacated.

Preston, Ont.

Plans have been prepared for business block for Werching Bros. All interior equipment will be required; also heating and lighting apparatus.

Plans have been prepared for business block on King street for B. W. Zieman. 3-storey, brick, 34 x 80, all store and office fittings required, telephones, elevators, electric fixtures and steam heating apparatus.

Quebec, Que.

Jos. Lemieux is building alteration to hardware store to cost $6,000. 3-sty., 50 x 75, brick, metal roof, hot water heating, electric lighting, hardwood floor, freight elevator. Contract for elevator awarded to Drolet.

Regina, Sask.

Plans are ready for department store to cost $30,000, for Bergl & Kusch, Regina, Sask. 2-storey, brick, electric ltg.

Security Lumber Co., Winnipeg, Man., are planning to construct lumber yards here south of the railway at a cost of $4,000.

Representative F. J. Robinson, Regina Development Syndicate, Room 102, Kerr Block, Scarth street, Regina, is contemplating the erection of a 5-storey office building.

St. John, N.B.

Contracts will be let shortly for warehouse for Ames Holden McCready Ltd., Montreal. Architect, F. Neil Brodie. 5-storey, mill construction, brick, concrete foundation, steam heating, electric lighting, plumbing, tar and gravel roof, cut stone trimmings, freight elevator, sheet metal work, fireproof floors and windows.

Saskatoon, Sask.

Mr. Patmore is contemplating the erection of an office building to cost $70,000, 2nd avenue between 22nd and 23rd street. 3-storey and fireproof.

A permit has been granted for business block to cost $10,000, for Chas. Smith, Concrete foundation, brick, steam heating, electric lighting.

Stratford, Ont.

The ratepayers will vote on by-law to aid the McDonald Thresher Co. to erect a factory at a cost of $60,000.

M. W. Moore has secured a site for the erection of a cigar factory.

Toronto, Ont.

Tenders are open for erection of a branch bank, cor. Maine and Water Sts., for Bank of Toronto. Two storeys, 58 x 35, terra cotta front, tiles and electric lighting.

Plans are in progress for alterations to store, cost $3,000, Yonge near Trinity Square, for A. Levy, Yonge street. Architect, A. J. Rattray, 123 Bay street. Brick, cut stone, stucco, plate and art glass, tar and gravel roofing.

Plans are in progress for pair stores and dwellings to cost $6,000, N.W. cor. Dundas and Kenneth, for Wm. Barrett, 331 Symington avenue. Architect, Jno. Hook, 171 Yarmouth road. 2-storey.

Dominion Government, Ottawa, plan a new examining warehouse to cost $600,000 and remodelling of old warehouse to be turned into examining warehouse. New public building will be erected on Federal Square.

Tenders are called for addition to office building of Might Directories Ltd., 74 Church street. Architect, C. J. Gibson, 75 Yonge street, Toronto. 4-sty. and basement, 28 x 100, concrete footings, brick foundation, brick walls, structural steel, felt and gravel roofing, electric light, skylight, hoist, hardwood floors and interior finish, vaults, plate glass.

Tenders are open for stores and offices to cost $10,000, 163 Yonge street, for L. J. Cosgrave, 565 James street. 4-storey, brick, concrete foundation, tar and gravel roofing, cut stone.

Tenders are open for store to cost $4,500, Gerrard street near Pape, for B. A. Peglar, 1032 Gerrard street. Architect, Redmond & Beggs, Kent Bldg. 2-storey, brick.

Tenders are open for store and dwelling to cost $8,000, S.W. cor. Bloor and Clinton, for J. W. Brown, 17 Westmoreland avenue. Architect, J. H. Stanford, Bloor and Ossington. 3-storey, brick, tar and gravel roofing.

Tenders are open for warehouse to cost $25,000, 90 Sherbourne, for J. M. Lowes Co., Ltd., 90 Sherbourne street. 6-storey, brick, tar and gravel roofing, structural steel, cut stone, tiles, hardwood finish, reinforced concrete, metal sash, freight elevators.

Tenders are open for offices to cost $15,000, 282-4 Yonge street, for C. R. Cuthbertson, 108 Bloor street west. Architect, Redmond & Begg, Kent Bldg. 5-storey, brick, tar and gravel roofing, structural steel, art stone, stucco.

Plans are in progress for stores and dwellings to cost $4,800, 146-152 Agnes street, for S. Rosenberg, 50 Colborne street. Architect, S. A. Waggett, 61 Bleecker street. 2-storey, brick, storefronts plate and art glass, tar and gravel roofing.

Tenders are open for factory to cost $25,000, Front and Princess streets, for Smith Manufacturing Co., 221 Front st. E. Architect, Wm. Geo. Burns, 24 Indian Grove. Machinery, Looms & Vintty. 4-storey and basement, brick and mill construction tar roofing, art stone.

Welland, Ont.

P. Whalley has recently purchased the Arlington Hotel and is planning extensive alterations.

Tenders are called for stores and flats to cost $6,000, for Frank Carroci. Architect, T. L. Nicholls, Welland. 2-storey, 38 x 50, stone foundation, brick, electric light.

Weyburn, Sask.

Tenders are called for business block to cost $65,000, for W. B. Proctor & Co., 42 Victoria street, Toronto. 4-sty., 50 x 100, concrete foundation, brick and stone, steam heating, electric lighting. Passenger elevator.

Frank Moffat is planning to erect a 3-storey brick business block.

The Soo Milling Company, F. J Ballantyne, manager, plan extensions to increase capacity from 150 barrels to 500 barrels.

Moose Jaw Dairy Company will erect a creamery to be in operation for the [illegible] trade.

Winnipeg, Man.

A permit has been granted to erect two residences, cost [illegible], [illegible] avenue, for Andrews & Sons, [illegible] Portage and Victor. [illegible] and a half storeys, 32 x 32, frame, stone foundation, hot water heating, electric lighting, shingle roofing.

Windsor, Ont.

Tenders are called for extension, cost $6,000, McDougall avenue, for Canadian Siroco Company. Manager, Ralph T. Coe. One storey, 50 x 100, brick and steel.

Baum & Brody are planning to remodel stores at a cost of $5,000. New equipment and fittings will be required, also heating, lighting and telephone apparatus.

CONTRACTS AWARDED

Galt, Ont.

Contracts are awarded for business block. Contractors, — Mason work, Wirsching Bros., Galt; metal work, Metal Shingle & Siding Co.; iron work, Hamilton Bridge Co., Hamilton; lumber, James Gillies.

Hamilton, Ont.

Store and apartment building, 205 James street north, for A. J. Wright, 207 James street. Architect, Rastrich & Sons; carpentering, C. R. Reid, 305 John street north; plastering, G. Smith, 300 Victoria avenue north; masonry, Goward & Webber, 231 Mary street; tar and gravel and tinsmithing, Smith & Webber, 83 Bay street north.

Plans are in preparation for extension to elevator factory, Victoria ave. north, for Otis-Fensom Elevator Company, Traders Bank Building ,Toronto. Architects, Stewart & Witton, 2 Hughson street, Hamilton; contractor, W. H. Cooper, 199 Emeral street north. Two storeys, brick.

Kentville, N.S.

Faulkner & McDonald, Halifax, N. S., have been awarded the contract for the erection of a new building for the Royal Bank of Canada to cost $30,000. Local Manager, A. A. Thompson.

Montreal, Que.

Blacksmith shop and residence, cost $3,500, for H. Tussier, 253 Carriere. General contractors, Richer & Frere, St. Hubert street. Two storeys, 25 x 35, stone foundation, brick, gravel roofing.

Excavation is complete for store and flats, cost $7,000, cor. Laurier and Querbes street, Outremont, for C. A. Reeves, 59 St. James street. Architect, C. A. Reeves. Three storeys and basement, solid brick, hot water, 27 ft. x 86 ft., electric lighting, gravel roof. General contractor, A. Marchessault, 207 Desjardins ave., Maisonneuve.

Contract is awarded for Toilet Laundry, alterations, 425 Richmond street. Carpentry, Jackson & Co., 335 Hipernia road; painting, H. Daniels, 139 Fulford street; plumbing, J. A. Gordon, 301 St. Antoine street.

New Glasgow, N.S.

A. W. Allen & Son, Middleton, have been awarded the contract for the erection of the new [illegible] Hall, here.

Ottawa, Ont.

[illegible] Allan, 104 Sparks street, Ottawa. One storey (additional); solid brick; mason contractor, S. Garrock, Lewis street; [illegible]

Continued on page [illegible]

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your [illegible]. If you are in Montreal and he is in Vancouver the inspection [illegible]. Let us solve that [illegible]. Place on file copies of your plans and [illegible]s in any or all of the "Contract [illegible]"

[illegible]s and manufacturers read the "Con[illegible]." It is the logical place to look for [illegible]ed, and where most important works [illegible]

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
W[illegible]—[illegible]cial Travellers' Bldg
V[illegible]—12[illegible] Pender Street

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price. B. Shragge Iron & Metal Company, [illegible] Princess street, Corner King; Telephone St. [illegible] W[illegible]
11-23

Canadian Pacific Railway Company

Department of Natural Resources
Irrigation Branch

Tenders for Steel Highway Bridges

Sealed tenders, addressed to the undersigned, will be received up to noon of **April 15th, 1912**, for the design, manufacture and erection complete on piers to be provided by the Railway Company, of the following Steel Highway [illegible]

Two Bridges, span 125 feet.
Four Bridges, span 100 feet.
Fourteen Bridges, span 75 feet.
Nine Bridges, span 60 feet.

Contract, specification, form of tender and general instructions may be had on application to the undersigned. A deposit of $25.00 will be required before specifications will be given out, which will be returned on receipt of a bona fide tender.

Tenders will only be received from parties who can show a reasonable acquaintance with work of the required character, and that they have the facilities and plant necessary for work of such magnitude.

A certified cheque or cash deposit to the amount of five per cent. of the tender must accompany all bids as a guarantee that the bidder will enter into a contract for the work should it be awarded to him, and which will be forfeited as liquidated damages should the bidder default.

Cheques or deposits of the unsuccessful bidders will be returned within ten days after the [illegible]

The right is reserved to the Company to reject any or all tenders and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 1, 1912. 11-14

Notice to Architects

Plans and specifications will be received by the undersigned for the erection of a wing to the General Hospital, Prince Rupert, B. C.

The building to be erected is to cost about $18,000 complete.

Four hundred and fifty dollars will be paid for the plans accepted.

The designs to be sent in by April 30th, 1912.

Blue prints of the present building are on file at the offices of the Contract Record at Toronto, Montreal, Winnipeg and Vancouver.

Prince Rupert General Hospital Association.
14-15

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope, "Tender for Paving," will be received by the undersigned up to 6 o'clock p.m. of **Monday, April 8th, 1912**, for paving the following streets:

Pearl street from Water to Court, curb and gutter, 1,836 lin. ft.; pavement in sq. yds., 4,360.

Bay street from Cumberland to Algoma, curb and gutter, 2,930 lin. ft.; pavement in sq. yds., 4,784; track laying, 3,250 sq. yards.

Algoma street from Bay to Queen, curb and gutter, 4,000 lin. ft.; pavement in sq. yards, 5,785; track laying, 4,340.

Totals, curb and gutter, 8,766; pavement in sq. yds., 14,929; track laying, 7,590 sq. yards.

Tenders will be received for Sheet Asphalt, Asphalt Block and Bitulithic.

Further instructions as to specifications and forms of tender may be obtained from L. M. Jones, City Engineer, Port Arthur.

A marked cheque for ten per cent. of the estimated amount of contract must accompany each tender.

The lowest or any tender not necessarily accepted.

J. McTEIGUE, City Clerk.
Corporation Offices, Port Arthur.
March 9th, 1912. 11-14

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA.

To Canadian Architects

Competition for New University Buildings to be erected at Point Grey, near Vancouver, British Columbia

The Government of British Columbia invite Competitive Plans for the general scheme and design for the proposed new University, together with more detailed Plans for the buildings to be erected first at an estimated cost of $1,500,000.

Prizes of $10,000 will be given for the most successful Designs submitted.

Particulars of the competition and plan of site may be obtained on request from the undersigned.

The designs to be sent in by July 31st, 1912, addressed to

THE MINISTER OF EDUCATION,
Parliament Buildings,
10-15 Victoria, British Columbia.

Machinery For Sale

1—70-ton Style C Bucyrus Shovel.
4—18-ton Porter Dinkies, 36-in. gauge.
1—12-ton Porter Dinkie, 36-in. gauge.
50—4 cu. yd. two-way Dump Cars.
1—80 h.p. Boiler on Skids.
1—30 h.p. Maruir Type Boiler.
1—Air Compressor and Tank.
80—G. T. 56 lb. Relaying Rails.

All in first class order for immediate shipment.

FRASER, BRACE & COMPANY,
P. O. Box 121,
12-15 Valleyfield, P. Q.

CITY OF MOOSE JAW, SASKATCHEWAN

Tenders For Steam Plant

Sealed tenders marked "Tenders for Steam Plant," addressed to the City Commissioners, Moose Jaw, will be received up to 10 a.m. of **Wednesday, April 17th, 1912**, for contract "D" consisting of:—

Section 1. Water-tube boilers and accessories.
Section 2. Mechanical draft equipment.
Section 3. Fuel economizer.
Section 4. Coal and ash handling equipment.

Specifications and all information may be obtained on application to J. D. Peters, Electrical Superintendent, Moose Jaw.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, Sask.,
March 12th, 1912. 12-14

Canadian Pacific Railway Company

Department of Natural Resources

Tenders for Concrete Construction

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Concrete Structures," will be received up to noon of **May 1st, 1912**. The work to be let includes the concrete structures in about half of the area comprising the Eastern Section of the Company's Irrigation Block, Alberta. Materials, except for forms, will be furnished by the Company. Materials for forms and all labor must be furnished by the Contractor. The approximate quantities are: 15,000 cubic yards of concrete and 1,200,000 pounds of reinforcing steel. The quantities in individual structures vary from 5 cubic yards to 700 cubic yards.

Plans, specifications and full information will be furnished after April 1st, 1912, on application to the undersigned. A deposit of $100 will be required before plans, etc., will be given out, which will be refunded on their return in good condition.

All proposals must be accompanied by a certified cheque, payable to the undersigned, for five per cent. of the amount of the tender, to be forfeited as liquidated damages should the bidder neglect or refuse to enter into a contract in the event that the work is awarded to him.

Proposals must be made on the standard form provided. Alterations thereto, interlineations or qualification of prices may invalidate the bid.

The right is reserved to reject any or all bids and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 20, 1912. 13-15

TENDERS

Tenders are desired up to **April 15th** for two mechanical filters, 8 feet diameter by 20 feet long with all pipes, roses and fixtures. For specifications, etc., apply on or after the 1st of April, 1912, to

W. H. TRETHEWEY,
14 [illegible]

CITY OF MOOSE JAW
SASK.

Tenders for Sewer Pipe and Specials

Sealed tenders, marked "Tenders for Sewer Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, April 15th, 1912,** for the delivery of the following, F.O.B. cars Moose Jaw:
20,000 feet of 8-in. pipe.
20 Tee-y's, 6-in. off 10-inch.
800 Tee-y's, 6-inch off 8-inch.
250 8-inch channels.
5 Tees, 10-inch off 10-inch.

Tenderers must time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, March 26, 1912. 14-15

TOWN OF SUDBURY
Province of Ontario

Sewerage Works

Sealed tenders will be received by the Town Clerk until 8 p.m. on **Wednesday, April 17th, 1912,** for the following works:—

Contract "A"—Main Sewer, 8,555 feet, 20-in., 18-in. and 15-in.

Contract "B"—Sanitary Sewers and Force Main.

Contract "S"—Sewer Pipes and Junctions.

Plans and specifications may be seen at the office of the Town Clerk, Sudbury, or at the office of the Engineers, Mail Building, Toronto

No tender necessarily accepted.

J. G. HENRY, Esq., Mayor,
GEO. TUDDENHAM, Esq.,
Chairman Sewer Committee.
GEO. ELLIOTT, Esq., Town Clerk.
CHIPMAN & POWER, Engineers.
13-14

CITY OF EDMONTON

Tender for Tunnel Sewer

[illegible] signed up to 6 o'clock **April 30th, 1912**, for the construction of a Reinforced Concrete Tunnel Sewer.

[illegible] "Tender for Tunnel Sewer."

[illegible] obtained at the office of the City Engineer, Edmonton.

[illegible] of the Contract Record and Canadian Engineer.

A deposit of ten ($10.00) dollars will be required for each set of specifications and plans.

All tenders must be accompanied by a certified cheque for one per cent. (1 p.c.) of the value of the [illegible]

The right is reserved to accept or reject any or all tenders.

[illegible]
[illegible] 14-16

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

CITY OF REGINA

Water Collecting Pipe Lines, Etc.

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon on **Friday, April 12th, 1912,** for the excavation of about three miles of trenching for and the laying therein of 6-inch to 15-inch vitrified pipes, construction of manholes, etc., for water collecting lines at the source of supply in the Boggy Creek Watershed near Regina.

The City reserves the right to reject any or all bids and to waive any irregularities therein.

Tenders for the whole or any part of the above work will be considered.

Accepted cheque for $2,000 must be deposited with each tender, or a proportionate cheque in case approximately 5 per cent. tender when only part of the works is tendered for.

Copies of plans, specifications, schedules and forms of tenders and full information may be had from the undersigned.

R. O. WYNNE ROBERTS,
Consulting Engineer,
P. O. Box 65, Regina, Sask.
City Hall,
March 23rd, 1912. 14-15

CITY OF MOOSE JAW
SASK.

TENDERS
for Cast Iron Pipe and Specials

Sealed tenders, marked "Tenders for Cast Iron Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, April 15th, 1912,** for the following, delivered F.O.B. cars Moose Jaw:
10,000 feet of 6-in. pipe, Class C., weight 35.8 lbs. per foot.
5 Reducers, from 8 to 6, Class D.
[illegible]
[illegible]
10 6-in. Plugs.
2,150 feet of 4-in. pipe, Class A., weight 20 lbs. per foot.
7,000 feet of 12-in. pipe, Class C., weight 91.7 lbs. per foot.
2,200 feet of 10-in. pipe, Class C., weight 70.8 lbs. per foot.
[illegible]
3 Tees, 10-in. off 12-in.
[illegible]
[illegible]
1 Reducer from 8-in. to 6-in.
[illegible]
[illegible]
5 10-in. Sleeves.
5 4-in. Sleeves.

[illegible] of Civil Engineers.

Tenderers must state time of delivery.

The lowest or any tender not necessarily accepted.

[illegible]
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
[illegible] 14-15

To Contractors

Tenders will be received at the office of Sy[illegible] & R[illegible] 12 [illegible] **April 22nd,** for all trades required in the erection of St. Alban's Cathedral, Toronto. Drawings, specifications and other information may be obtained at the office of

SYMONS & RAE,
Superintending Architects,
15 Toronto Street, Toronto.

No tender will be necessarily accepted.

CRAM, GOODHUE & FERGUSON,
Architects,
14-15 Boston and New York.

City of London, Ontario

Board of Water Commissioners

Specifications and forms of tender for the following material may be obtained on application:
100 tons 18-in. cast iron pipe.
450 tons 12-in. cast iron pipe.
25 tons 10-in. cast iron pipe.
5 tons 8-in. cast iron pipe.
65 tons 4-in. to 6-in. cast iron pipe.
35 tons special castings of various tpyes and sizes.

H. J. GLAUBITZ,
14-15 General Manager.
London, Ont.

BOARD OF EDUCATION

Advisory Industrial Committee

TORONTO

A pamphlet, stating the conditions of the competition for the selection of an Architect for the proposed new Technical School Building to be erected in the City of Toronto, may be had on application to any one of the three Assessors appointed by the Advisory Industrial Committee—Dr. A. C. McKay, Technical High School, Toronto; Mr. A. Frank Wickson, of Wickson and Gregg, Architects, 59 Yonge St., Toronto; Professor Percy E. Nobbs, of Nobbs & Hyde, Architects, Beaver Hall Hill, Montreal.

The plans submitted by competitors are to be delivered to the assessors on June 15th, 1912

W. O. McTAGGART,
Chairman of Advisory Industrial Committee,
14 W[illegible] WILKINSON [illegible]

CITY OF SASKATOON

Tenders for Concrete Sewer Pipe

Sealed tenders, addressed to the City Com[illegible] Sewer Pipe," will be received up to twelve o'clock noon on **Friday, April 19th, 1912,** for the [illegible] tained on application to George T. Clark, City [illegible]

[illegible]
W. B. NEIL, City Commissioners.
E. M. SNELL, 14-15
[illegible]

Church of the Holy Family

Hanover, Ont.

[illegible] h at Hanover, Ont.

[illegible] R. C. Presbytery, at Carlsruhe, also at the office [illegible]

[illegible]

CHURCH OF ST. MARY

St. Catharines, Ont.

Tenders will be received by the Rev. F. Smyth, St. Catharines, until 5 o'clock on [illegible] **April 11th**, for Masonry, Carpentry, [illegible] and Painting, required in the erection [illegible] stone church.

Plans and specifications may be seen at St. Mary's Presbytery, St. Catharines, also at the office of the undersigned.

Satisfactory security will be required for the faithful performance of the contract.

The lowest or any tender not necessarily accepted.

ARTHUR W. HOLMES, Architect,
14 10 Bloor Street East, Toronto.

Town of Battleford, Sask.

Laying Cement Sidewalks

Sealed tenders, addressed to the Secretary-Treasurer of the Town of Battleford and endorsed "Tender for Cement Sidewalks," will be received up to noon of Monday, April 15th, 1912, for the following:—

Approximately 150,000 square feet of Cement [illegible] with crossings and curbing.

[illegible] it in the amount of $500 must accom[illegible] tender, and a bond in the amount of [illegible] will be required of the successful bidder.

The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained from the Town Engineer or at the office of the Canadian Engineer, Winnipeg.

WM. KITSON, Town Engineer.
H. C. ADAMS, Secretary-Treasurer.
14

CITY OF PRINCE ALBERT

TENDERS

The opening of tenders for Contract 12 G, previously advertised for March 20, is postponed [illegible] **Monday, April 15th, 1912.**

Sealed tenders addressed to the undersigned [illegible] "Tenders for Construction," will be [illegible] the City Commissioners until noon [illegible] **the 15th day of April, 1912,** for the [illegible]

[illegible] tract 12 G.—2,400 lin. ft. Concrete Outfall [illegible]

[illegible] nstructions to Bidders, Specifications and [illegible] at the office of the City Engineer of the City [illegible]

[illegible] a marked [illegible] ue to the amount of five per cent. of the amount of the tender, made payable to the Sec[illegible]

C. O. DAVIDSON,
Secretary-Treasurer.
Dated at Prince Albert, Sask.
February 29th, 1912. 14

Town of North Battleford

Province of Saskatchewan

Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer as follows:—

(1) Until 8 p.m. on **Monday, April 22, 1912,**
Contract "T"—Constructing 180,000 square feet of Concrete Walks.

(2) Until 8 p.m. on **Tuesday, April 30, 1912,**
Contract "A"—Labor laying Water Mains and Sewers.
Contract "B"—Construction of Power House.

(3) Until 8 p.m. on **Wednesday, May 15, 1912,**
Contract "H"—Furnishing and Erecting Boiler.
Contract "J"—Furnishing and Erecting 750 h.p. Steam Engine and Accessories.
Contract "K"—Furnishing and Erecting 500 kw. Generator and Equipment.

Plans and Specifications may be seen at the office of the Engineers, Toronto and Winnipeg, **and at the Town Hall, North Battleford, on and** after the following dates:—

(1) April 3rd, 1912; (2) April 10th, 1912; (3) **April 17th, 1912.**

The lowest or any tender not necessarily accepted.

For further information apply to the undersigned.

J. GRIESE, Esq., Mayor.
H. W. DIXON, Esq., Secretary-Treas.
CHIPMAN & POWER, Engineers.
14

TOWN OF HIGH RIVER

PROVINCE OF ALBERTA

Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on **Tuesday, April 30th, 1912,** for the following works:—

Contract "A"—Labor laying Water Mains and Sewers.
Contract "C"—Furnishing materials for and Erecting Water Tower.
Contract "D"—Furnishing Cast Iron Water Pipes and Special Castings.
Contract "E"—Furnishing Fire Hydrants, Gate Valves, Etc.
Contract "O"—Labor on Main Outfall Sewer.
Contract "S"—Furnishing Sewer Pipes and Junctions.
Contract "W"—Furnishing 4,500 feet of 12-inch Wooden Pipe.

Tenders will shortly be called for Power House, Machinery, and Sewage Disposal Works.

Plans and Specifications may be seen at the office of the Engineers, Toronto and Winnipeg, and at the Town Hall, High River, on and after April 8th, 1912.

The lowest or any tender not necessarily accepted.

For further information apply to the undersigned.

R. A. WALLACE, Esq., Mayor.
GEO. E. MACK, Esq., Secretary-Treas.,
CHIPMAN & POWER, Engineers.
14-15

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

WANTED—Two Architectural Draughtsmen of five or six years' experience, steady work to right men, when applying state age, experience, and salary. Address Box 472, Contract Record. 14-15

Inspector Municipal Waterworks and Fire Appliances required by the Canadian Fire Underwriters' Association. Applicants must be qualified by knowledge of Hydraulic, Steam and Electric Power Engineering. Applications should be addressed to the Secretary, C.F.U.A., Coristine Building, Montreal, Que., and to receive attention must give details of present and past employment, age and salary expected. 14-15

PLANT FOR SALE

Little Giant Special Steam Shovel, 1¼ Yard Dipper. Also Large Size Steam Pile Hammer.
The Randolph Macdonald Company, Limited,
14-15 Toronto, Ont.

(Continued from page 69)

McLennan, Bank street; iron work, Dominion Bridge Co., Montreal, Que.

Contract is awarded for McAuliffe & O'Brien Building. Architect, W. E. Noffke, Central Chambers, Ottawa. Contracts for Terra Cotta Work, Northwestern Terra Cotta Company, Chicago, Ill.

F. X. Trepannier, Dalhousie Hotel, Ottawa, is erecting a shop and dwelling, on Rochester street, to cost $4,000. Two storeys, 50 x 40, brick veneer, gravel roof, electric lighting.

Regina, Sask.

Offices, cost $40,000, for Frank Nash. General contractor, Wilson & Wilson, Regina. Three storeys, 25 x 125, concrete foundation, electric light, steam heating.

Offices and stores, cost $45,000, Hamilton street, for Frank Nash. General contractors, Wilson & Wilson. Three storeys, 125 x 125, brick and stone, stone foundation, steam heating, electric lighting, hardwood floors, fire escapes, vaults, passenger elevator, dynamos, boiler, etc., patent roofing.

St. Catharines, Ont.

Contract is let for alterations to bakery for Wright Company. Masonry, Mr. Bennett, St. Catharines; carpentry, William & Chessler, St. Catharines; painting and glazing, Mr. Chapman, St. Catharines; plumbing and heating, Mr. Bald, St. Catharines. Baking requirements wanted.

Saskatoon, Sask.

Contract is awarded for stores and offices, cost $150,000, for S. E. W. Ross. Architect, W. S. Maxwell, Montreal. 7 storeys, reinforced concrete and brown brick, stone trimmings, three sets of vaults on each floor, two elevators.

Toronto, Ont.

Factory, cost $25,000, Charlotte street, for Benjamin Electric Mfg. Co., 64 York street, Toronto. Architects, Chadwick & Beckett, 15 Toronto street. Builder, Frank Armstrong, 89 Oak street. Two storeys and basement, brick, steam heating, tar and gravel roofing.

Wagon shed, cost $5,000, 224 Dundas street. Builder, Geo. Williams, Lakeview avenue. Tar and gravel roofing.

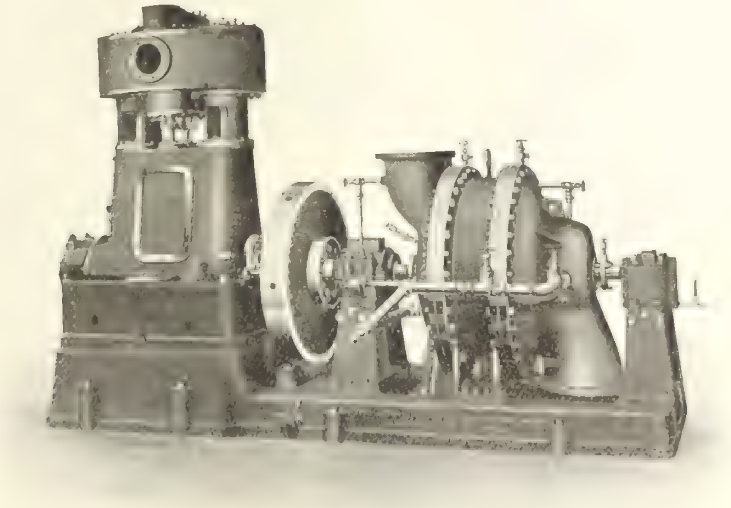
Factory on Wellington street, for Boyd, Brunnell, Limited, Wellington street. Architect, Wickson & Gregg, 59 Yonge street; masonry, Wickett Bros.; plastering, Taylor & Nesbitt.

Factory on Duncan street, for W. R. Phillips & Company, Duncan street. Architect, J. P. Hynes, Yonge street, Toronto; masonry, Vann & Evans; concrete, Thompson Construction Company; carpentry, W. Davidson & Co.; painting, M. J. Phelan.

Store and apartments, cost $8,000, Queen & Kingston road, for Wm. Davies Co., Ltd., 521 Front street east; builder, S. Clark & Son. Two storeys, brick, tar and gravel roofing, structural steel, cut stone, hardwood floors, plate and art glass.

Steam Driven Turbine Pump

which we made and installed for the City of Edmonton, Alta.



Six Million Imperial Gallons per 24 Hours Capacity—475 R. P. M.—80 ft. Head

We manufacture Pumping Machinery, Power Engines, Marine Engines, Mining Machinery, Condensers, Boilers of all kinds, Penstocks, Fertilizer Dryers, Stand Pipes, Blast Furnaces, Feed Water Heaters, Plate Work, Hydraulic Machinery, Air Pumps, Steam Pumps, Smoke Stacks, Hydraulic Presses, Special Machinery, Tanks (Water, Oil and Blow-off), Transmission Machinery, Vacuum Pumps, Vacuum Pans.

The JOHN INGLIS COMPANY Limited

Engineers and Boiler Makers

14 Strachan Avenue - - TORONTO, Canada

stores and apartments, cost $6,200 for Wm. Davies Co., Ltd., 521 Front street east; builder, S. Clark & Son. 2 storeys, brick.

Victoria, B. C.

Concrete garage, cost $60,000, for Metropolitan Motor Car Company. Architect, H. S. Griffith, 1006 Government street, Victoria. Contractors, Adkison & Dill, Homer and Davie streets, Vancouver. Three storeys, sheet metal.

Winnipeg, Man.

Excavation has started on alterations to store, cost $15,000, Portage and Carlton streets, for F. Steele, 360 Portage avenue. Architect, Wm. Fingland, 334 Portage avenue; general contractors, Dunn & Wallace, 759 Broadway. One storey, 34 x 65, brick, stone foundation, felt and gravel roofing, steam heating, electric lighting, maple and fir flooring.

Wolfville, N.S.

Contract is awarded for new bank building, for Royal Bank of Canada. Contractors, Faulkner & McDonald, Halifax.

Power Plants, Electricity and Telephones

Andover, N.B.

Plans are in preparation for telephone building, cost $4,000, for New Brunswick Telephone Co., St. John, N. B. Architect, McKane, St. John, N. B. 2½ storeys, 28 x 35, concrete foundation, frame, shingle roof, electric light, pine floors.

Gatineau Point, Que.

The Minister of Agriculture of Canada has advised and sanctioned the expenditure by government of $20,000 for electric light and roads. The town will pay $5,000.

Montreal, Que.

Contract is awarded for Sayers Electric Co., extensions on Bleury street, to Laurin Construction Co., Ltd., 17 Liverpool, London & Globe Building.

Niagara Falls, Ont.

Application is before the Legislature for extension of time to construct the Welland & Dunville Electric road. Work to start at once. Owner, Niagara Falls, Welland & Dunnville Ry.; president, F. R. Lalor; engineer, J. C. Gardner, Niagara Falls; secretary, F. E. Misner, Marshville.

Paris, Ont.

Telephone exchange; manager, C. H. Barker; contractor, Alex. Davidson. 24 x 75. All equipment will be needed. Electric light, steam heating.

St. Jerome, Que.

Following tenders received for power system, North River. Consulting Engineer, De Gaspe Beaubien, 112 St. James street, Montreal.

Transmission and distribution—	
Marchand & Donnelly, Ottawa,	$10,875
W. G. H. Cam, Montreal	12,975
W. J. O'Leary, Montreal	14,700
Can. Maloney, St. Catharines ..	$ 2,254
W. J. O'Leary, Montreal	2,300
Canadian General Electric	2,375
Marchand & Donnelly, Ottawa ..	2,481
Can. Westinghouse, Montreal ..	2,900
Generators—	
Roper Clark Co., Montreal ....$	4,940
Swedish Gen. Electric, Montreal	5,475
Rudel Belnap, Montreal	6,895
Eadie-Douglas, Ltd., Montreal..	5,475
Marchand & Donnelly	8,016
Can. General Electric, Montreal.	8,822
Canadian Westinghoue	9,850
Switchboards—	
Hill Electric, Montreal ....$	3,496
Can. Westinghouse, Montreal ..	4,100
Marchand & Donnelly	4,903
Canadian General Electric	5,377
Eadie-Douglas, Limited	5,472
Water Wheels—	
Francis Hankins, Montreal ....$	4,500
Wm. Hamilton, Peterborough ..	4,743
Rudel Belnap Mach. Co., Ltd. ..	4,850
S. Morgan Smith, York, Penn..	5,476
Can. Boving Co., Montreal	5,175
Eadie-Douglas Ltd., Montreal ..	6,065
Penstock—	
MacKinnon, Holmes, Sherbrooke	$5,850
Wm. Hamilton, Peterborough ...	6,450
Eadie-Douglas	7,565
Rudel Belnap Mach. Co., Ltd.	7,800
Penstock and concrete work—	
Laurentian Const. Co., Montreal	$33,814

Winnipeg, Man.

Contemplated, electrical apparatus, cost $23,000, Bird Hill Gravel Pit, for the City of Winnipeg. Engineer in charge, C. P. Kelpin, Stony Mountain, Manitoba. Tenders will be received shortly by Board of Control, Winnipeg. 13,000 volt line, $7,000; electric locomotive, $5,000; trolley line, $2,000; electrical shovel, $9,000.

Yarmouth, N.S.

Telephone building, for Maritime Telephone & Telegraph Co., 88 Hollis street, Halifax, N.S. Architect, H. E. Gates, Telephone Building, Halifax. Contractors, Rhodes & Curry Co., Amherst. 2-storey, 54 x 27.

Miscellaneous

Brighton, Ont.

The Reeve and Council of Brighton have instructed T. Aird Murray, of Toronto, to prepare plans for a gravity water supply. The water will be taken from springs located north of the town.

Carleton Place, Ont.

The Board of Water and Sewerage Commissioners have completed an agreement with Mr. T. Aird Murray, of Toronto, to act as consulting and supervising engineer for works of water supply, sewerage and sewage disposal. The town recently passed a by-law for a sum of $150,000 for the above purposes. Tenders will be called for in the course of a month and the work proceeded with this year with as little delay as possible.

Cobourg, Ont.

T. Aird Murray, of Toronto, has been engaged by the Corporation to prepare plans for a sewerage system, including disposal plant for the western section of the town; he will also prepare plans and specifications for a complete sewerage disposal system for the House of Refuge.

Niagara Falls, Ont.

Mrs. S. Logan, 8 Morrison street, has had plans prepared by Architect A. B. Robertson, Niagara Falls, for rebuilding stores and apartments. Three stys., 25 x 80, brick, frame, electric lighting, on Erie ave., cost $8,000.

Stuart Bros. are excavating for factory extensions. Two storeys, 30 x 40, brick, stone foundation, electric lighting, also 1-sty. brick boiler house, 15 x 30.

Ottawa, Ont.

Contracts are awarded for following supplies:—Engineering Equipment & Supply Company, arc lamp carbons, $742.85; Canadian Gen. Elect. Co., arc lamp globes, $220.95; Porc. Ins. knobs, $15.50; large split knobs, $9.00; solder, $50.00; switchboard panels, $2,430; transformers, $734. Roper Clark Co., Ltd., wire, $1,604.16; glass insulators, $60. Northern Electric Co., Toaist top pins, $32.76. Garrioch, Goddard Co., Gruirshan tape, $90; Sunbeam Incd. lamps, $1,440. Ferranti & Co., Ltd., meters, $1,087.28.

Toronto, Ont.

Tenders are open for vaults, to cost $5,000, for North America Life Insur. Co., 112 King street west. Architects, Langley & Howland, Continental Life Bldg. Brick, reinforced concrete foundation, concrete floors.

Welland, Ont.

Tenders have been rejected and plans altered for Holy Trinity Church. Bldg. Committee, J. R. McCollum and Wardens Cox and Boyle. New tenders will be called later.

Niagara, Welland & Lake Erie Railway Company will extend to Dain City, three miles, and will replace "T" rails on Main and Muir streets, Welland, with girder rails. President, C. J. Laughlin, Welland.

Windsor, Ont.

Elliott & Reid have been awarded the contract for construction of sewers to cost $20,000. Engineer, E. Brian, Windsor.

Winnipeg, Man.

Apartments for S. Anderson, 651 Bannatyne avenue. Architect, Paul Clemens, 331 Garry street. General contractor, Loftier Jorundson, 5th floor Builders' Exchange. Three storey, solid brick, stone foundation, electric lighting, steam heating, tar and gravel roof, hardwood finish.

Factory for H. Hilton & Sons, Winnipeg, Man. Architect, Wm. Fingland, Enderton Bldg. Gen. Contractor, Sutherland Construction Co. Calling for tenders on plumbing.

Tenders are called for church, cor. Elgin and Worth streets, for Sparling Methodist Church. Architect, Jas. Chisholm, Enderton Bldg. One sty., 46 x 72, concrete foundation, frame and concrete, shingle roofing, steam heating, electric light, hardwood and maple flooring.

Business Notes

Grassy Lake, Alta.

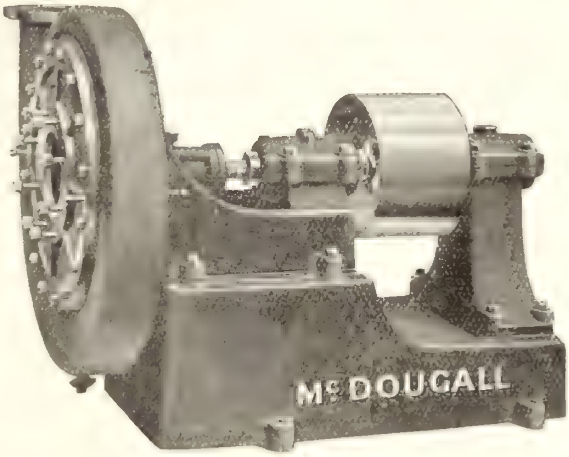
The Medicine Hat Milling Company's mill and elevator completely destroyed by fire, combined loss of grain and building is about $18,000. The company will rebuild.

Lucknow, Ont.

Royal Hotel, owned by Mr. Trott, of St. Helens, completely destroyed; loss $10,000. Building will be rebuilt.

Dredging and Sand Pumps

Our dredging and sand pumps are specially designed for use where there is a large percentage of solid matter in the water. The casings are very heavy to resist abrasion and the openings large to facilitate the passage of solids. In dredging work, the pumps will carry a mixture containing as high as 25 per cent. of sand.



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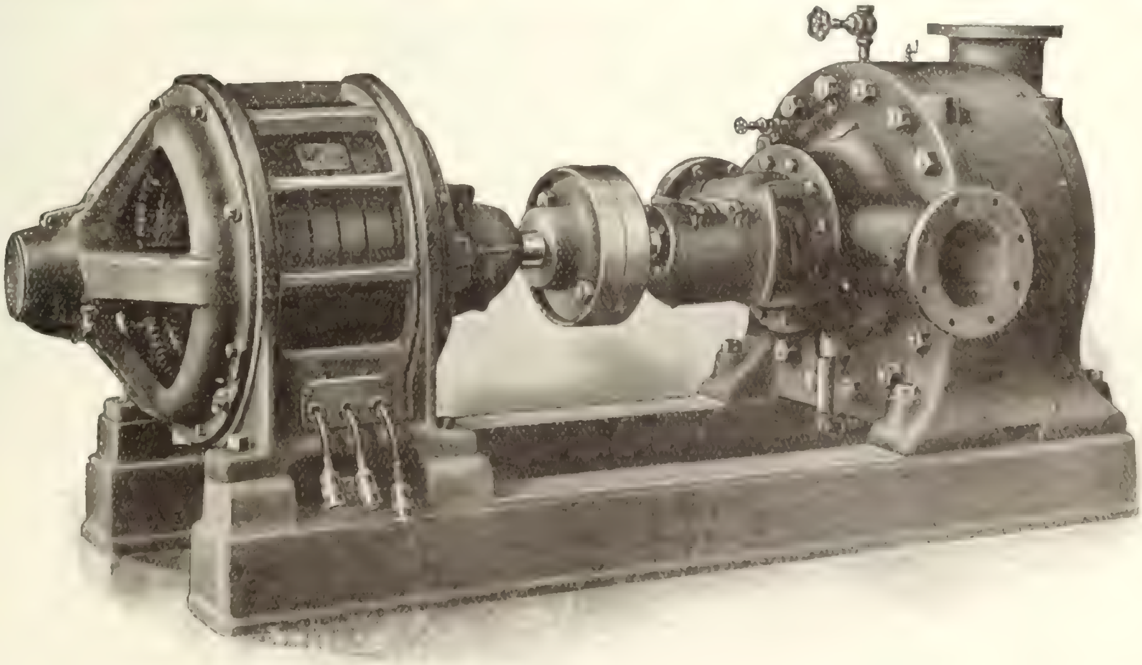

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10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line **2,600 Lbs.**
On a Double Line will Lift. **5,200 Lbs.**

160 Feet per Minute
80 Feet per Minute

Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

Weight with Boiler, 4,000 lbs; without Boiler, 2,400 lbs. Light enough to be moved about easily.

Length over all, 5 ft. Width over all, 5 ft. 10 in. This Engine is also made non-reversing, at a reduced price and weight. Made with One Drum or Two Drums.

Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

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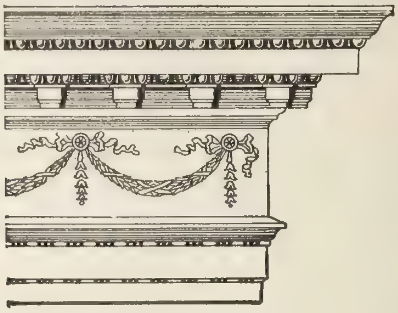

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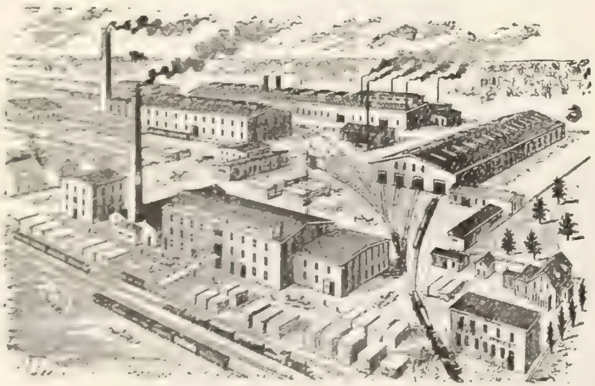

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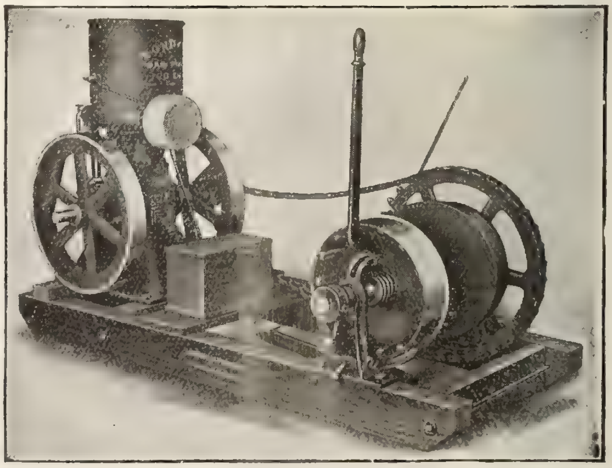

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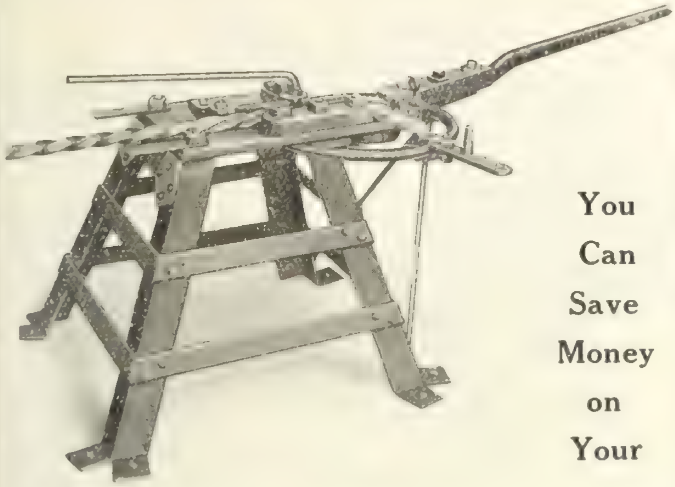

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Enquiries and correspondence respectfully solicited.

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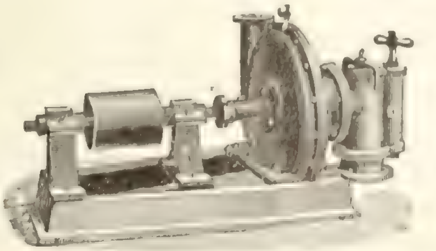

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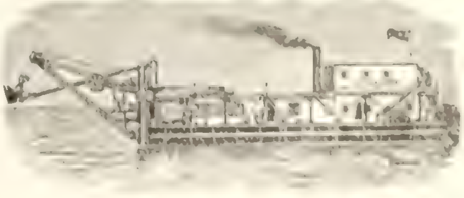

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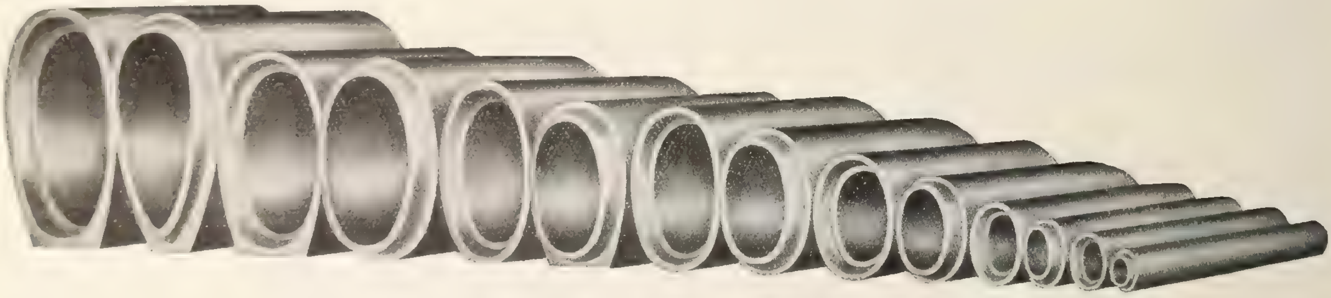

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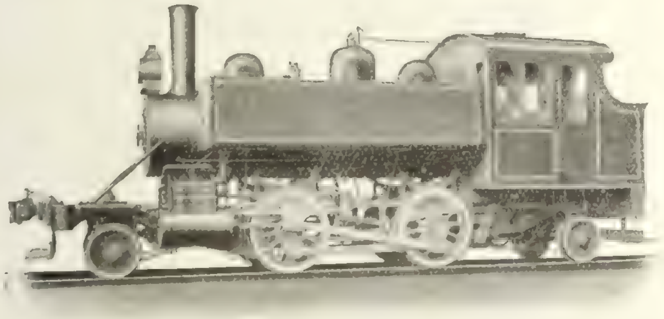

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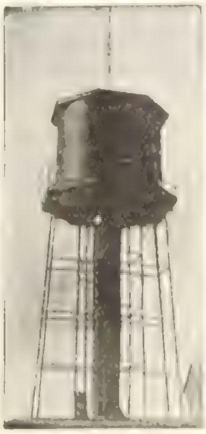

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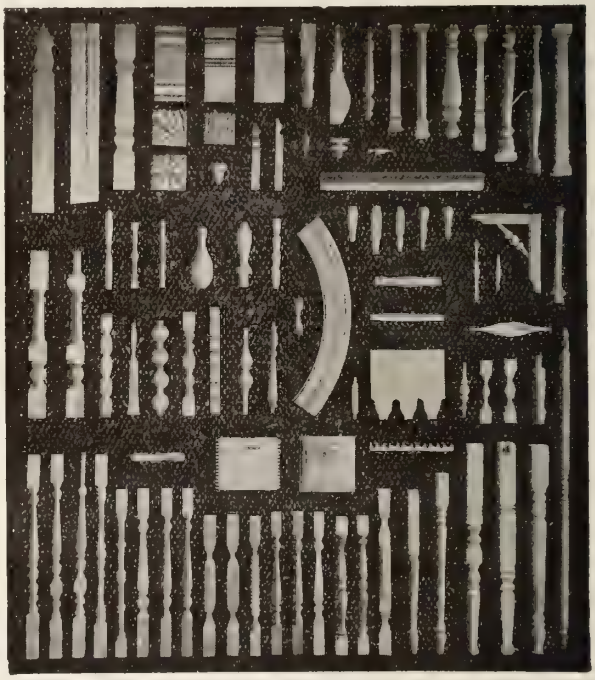

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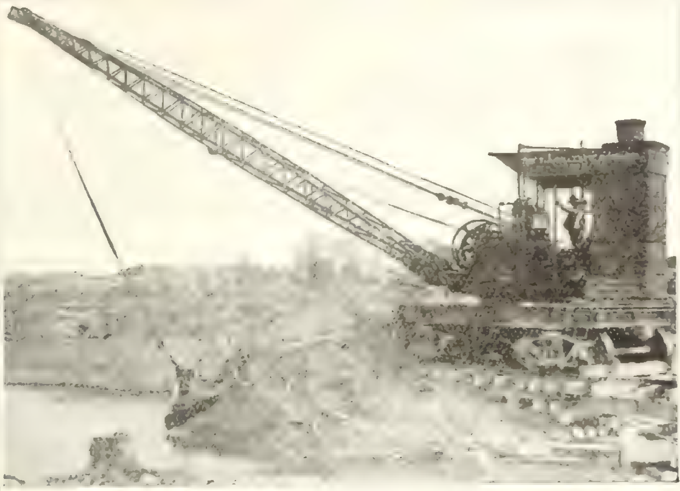

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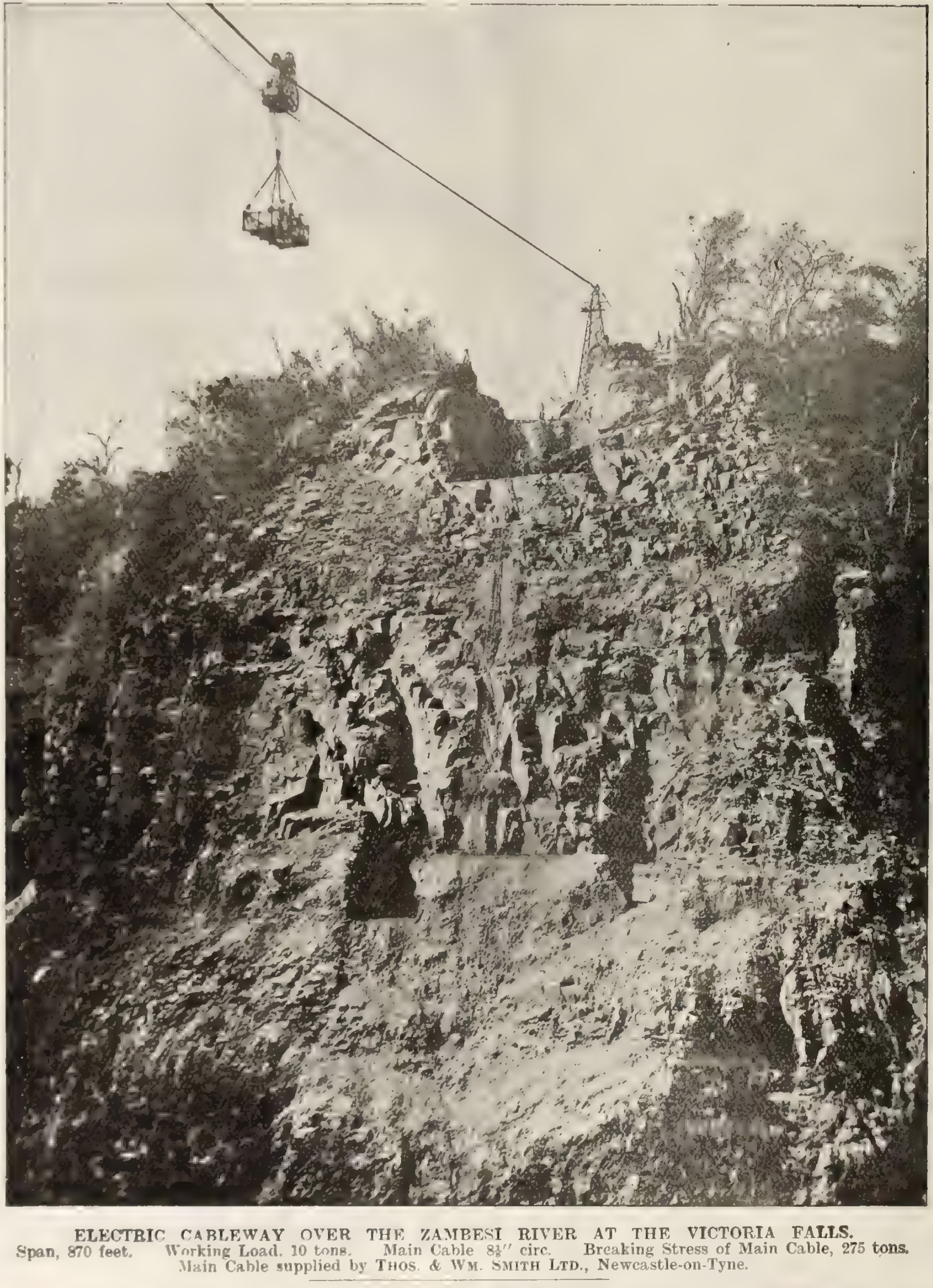

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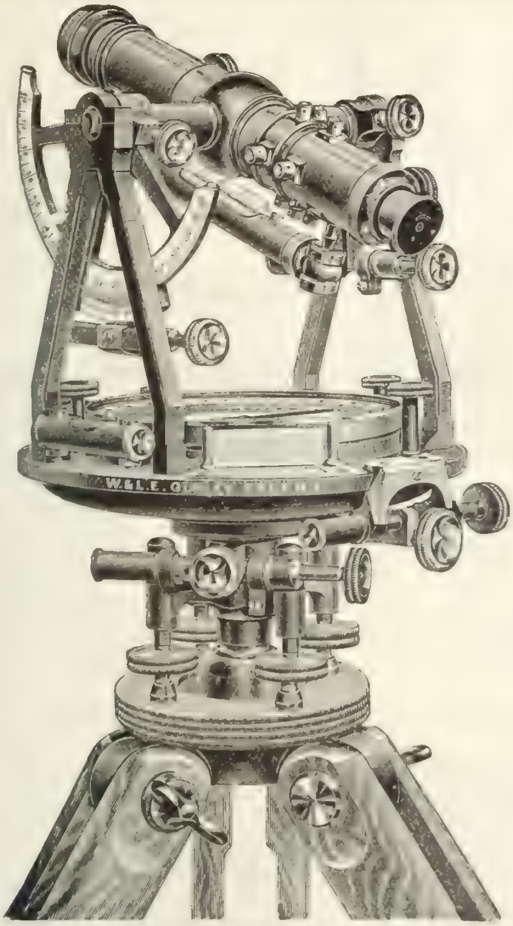

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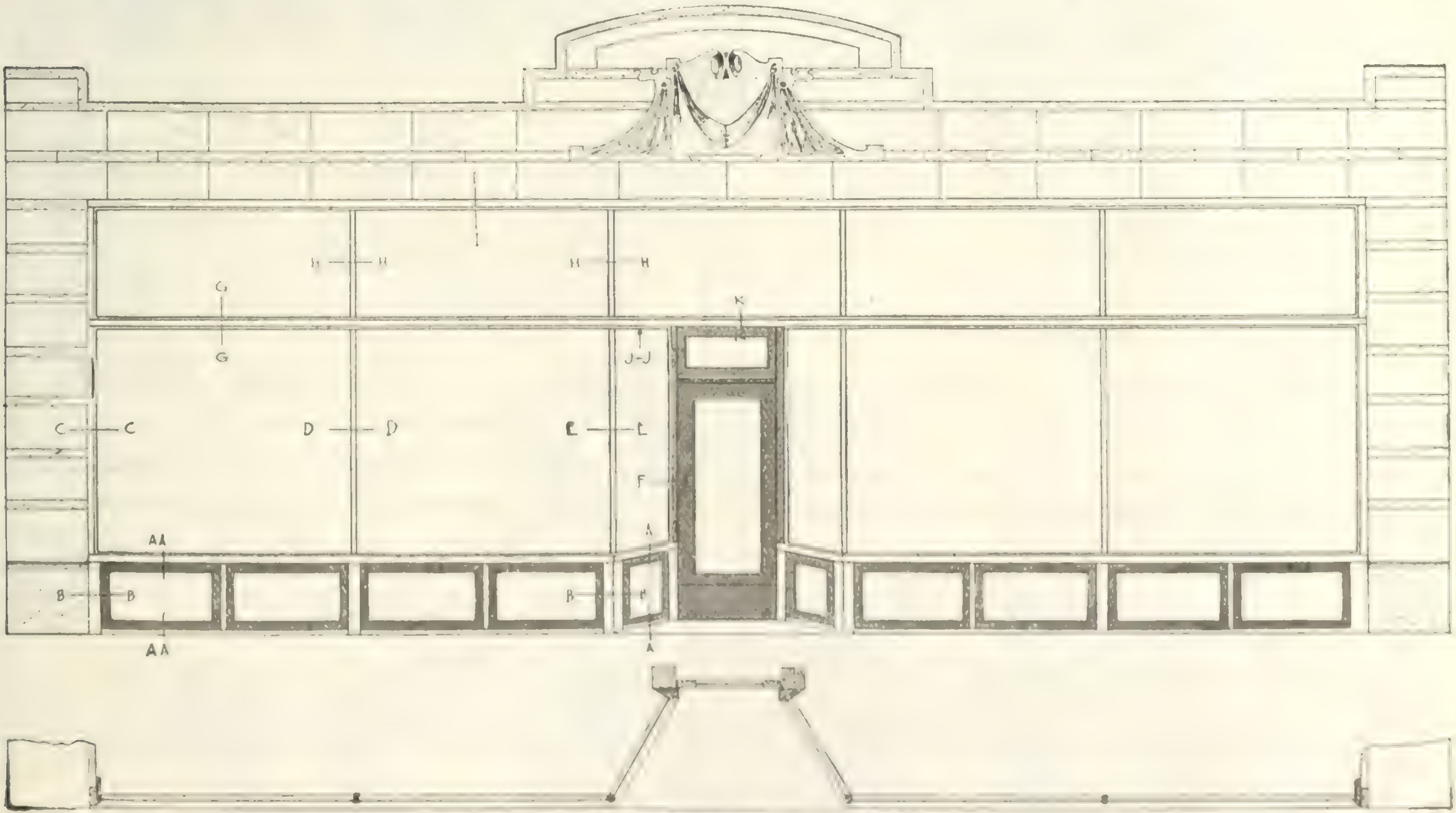

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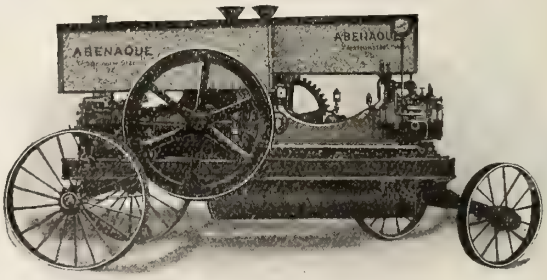

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Portable Compressor Outfits

costs but $12.00 per day to operate and saves the labor of 30 men. It is a money saver for every contractor using it. Let us show you where you can save money on your contract. **Write for Catalogue "M".**

Abenaque Machine Works
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ELATERITE Paints and Waterproofings
Are Superior to ALL Others.

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Portland Cement, Lafarge Cement, Gravel, Sand, Rubble, Imported and Canadian Pressed Brick for front work and fireplaces.
CRUSHED STONE—Dimension and Coursing Stone, Lime
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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

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Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D D
25	$2.65	$4.05
40	2.85	4.50
50	3.25	4.81
60	3.45	5.50
70	3.75	6.32
80	4.25	6.87
85	4.70	7.70
90		9.07
96		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal

WINNIPEG

	4ths Single	3rds Double
Up to 25 u i	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

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Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

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No. 4 compression bath cock .... net $1.75

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

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30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks

16 x 24, $1 00; 18 x 30, $1.15; 18 x 36, $1 95

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5¼ cents. per lb.; traps and bends, 45 per cent

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2 57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

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Binder stone, $1.30 per ton, f.o.b. Toronto.

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Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

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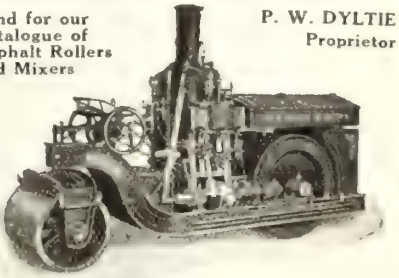

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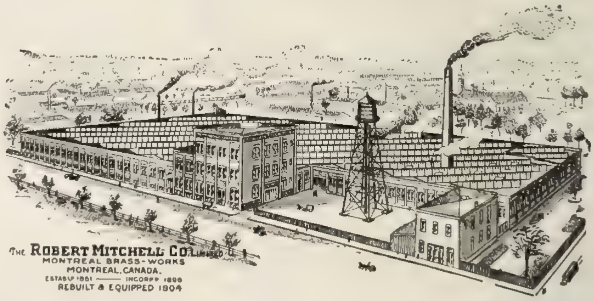
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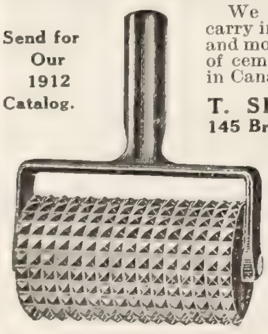

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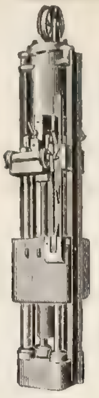

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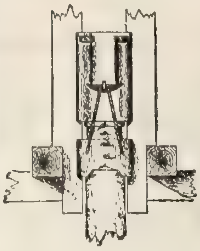

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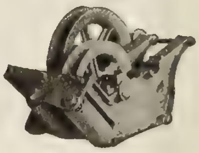

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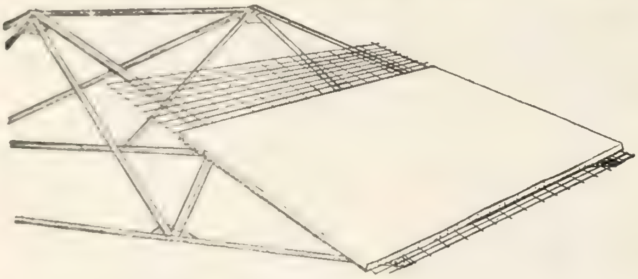

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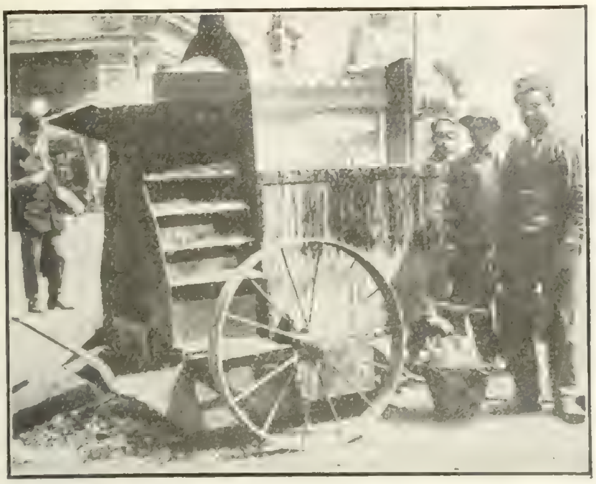

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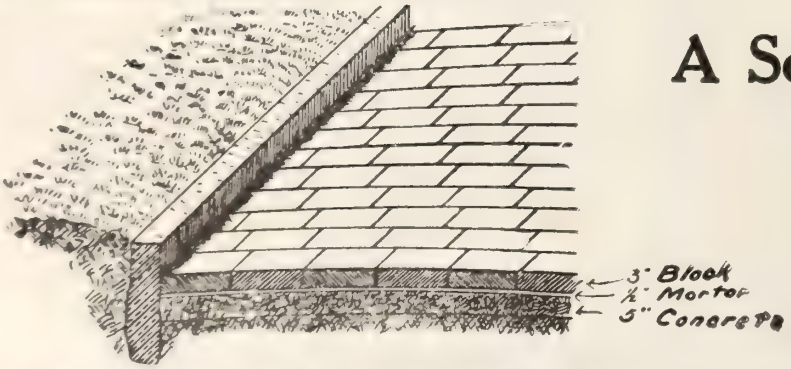

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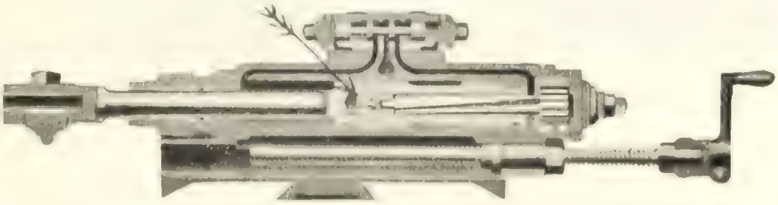

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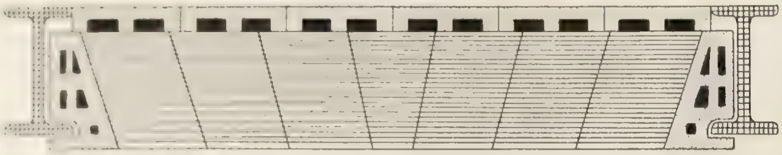

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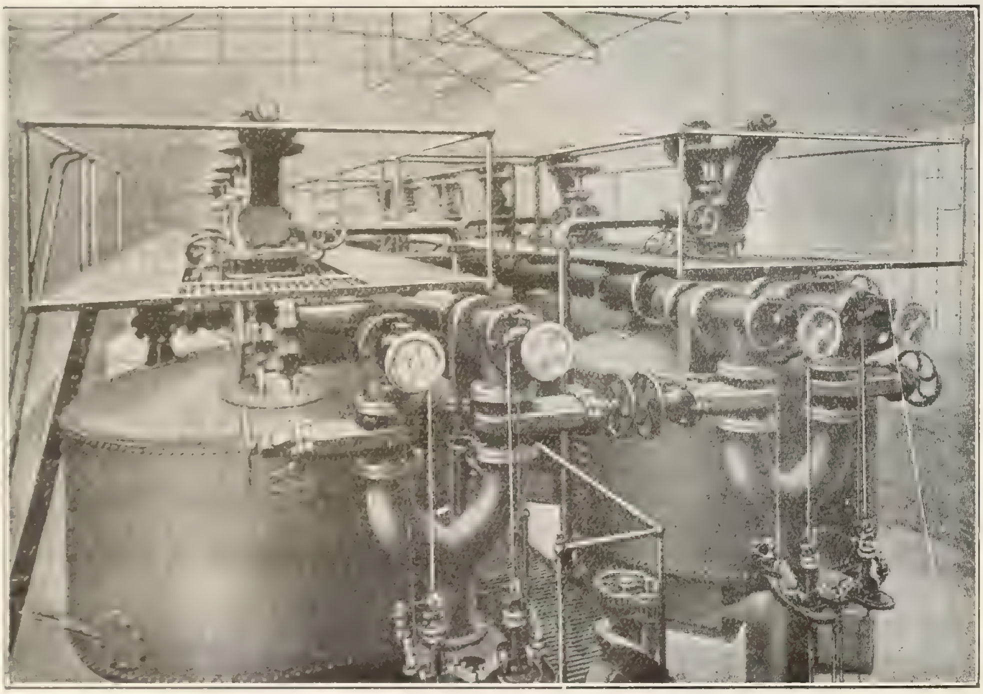

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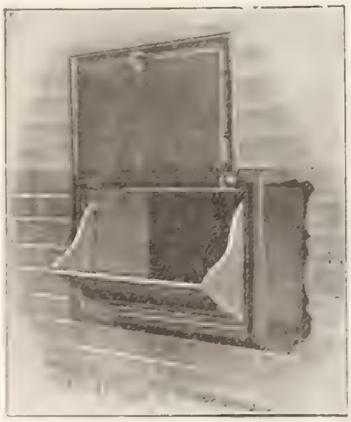

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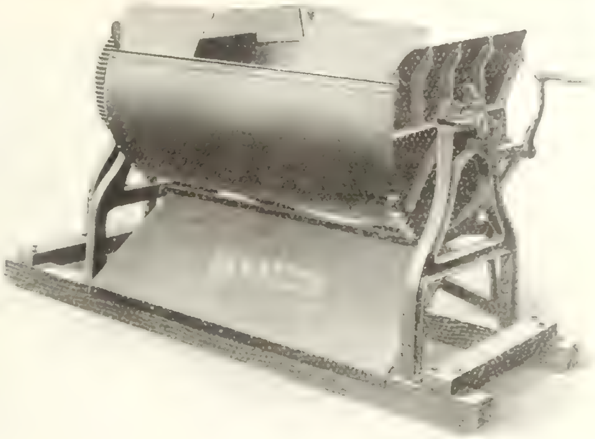

Blystone Skid Mixer

One of the great features of this Batch Mixer is the simple but effective dumping device, worked by the crank handle on the right. Three turns forward dumps the material and three turns back replaces the mixer in position for the next batch. So accurately balanced a ten year old boy can dump it. A thoroughly efficient machine, it will thoroughly mix the concrete in minimum time and discharge the material quickly. The above cut shows the mixer ready for filling.

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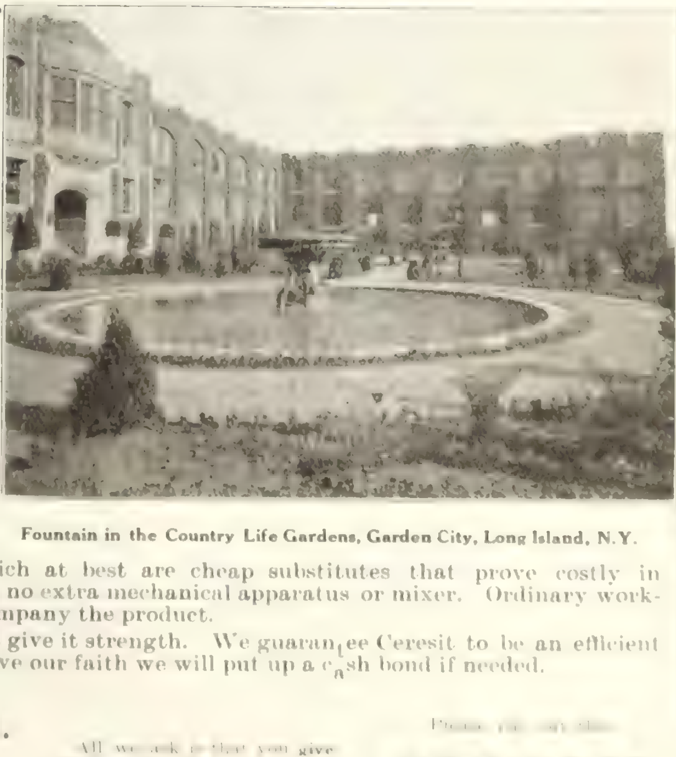

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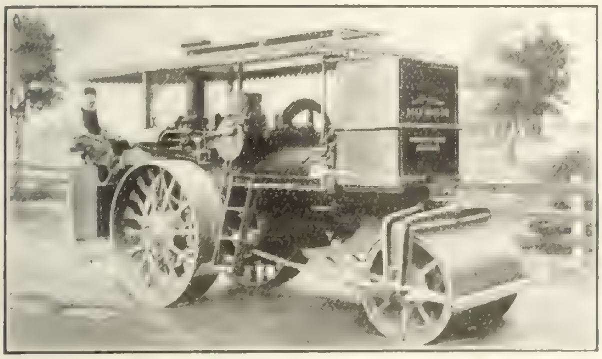

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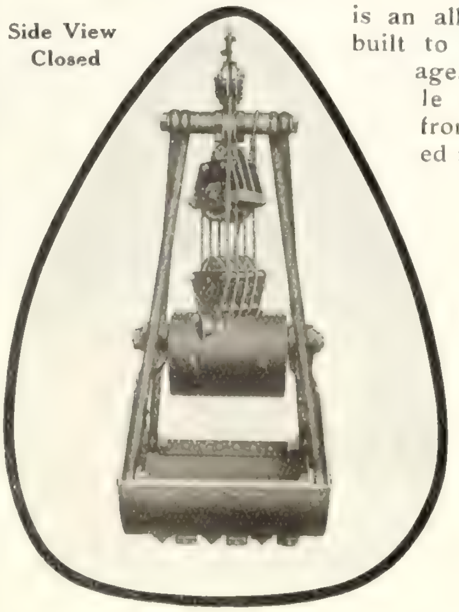

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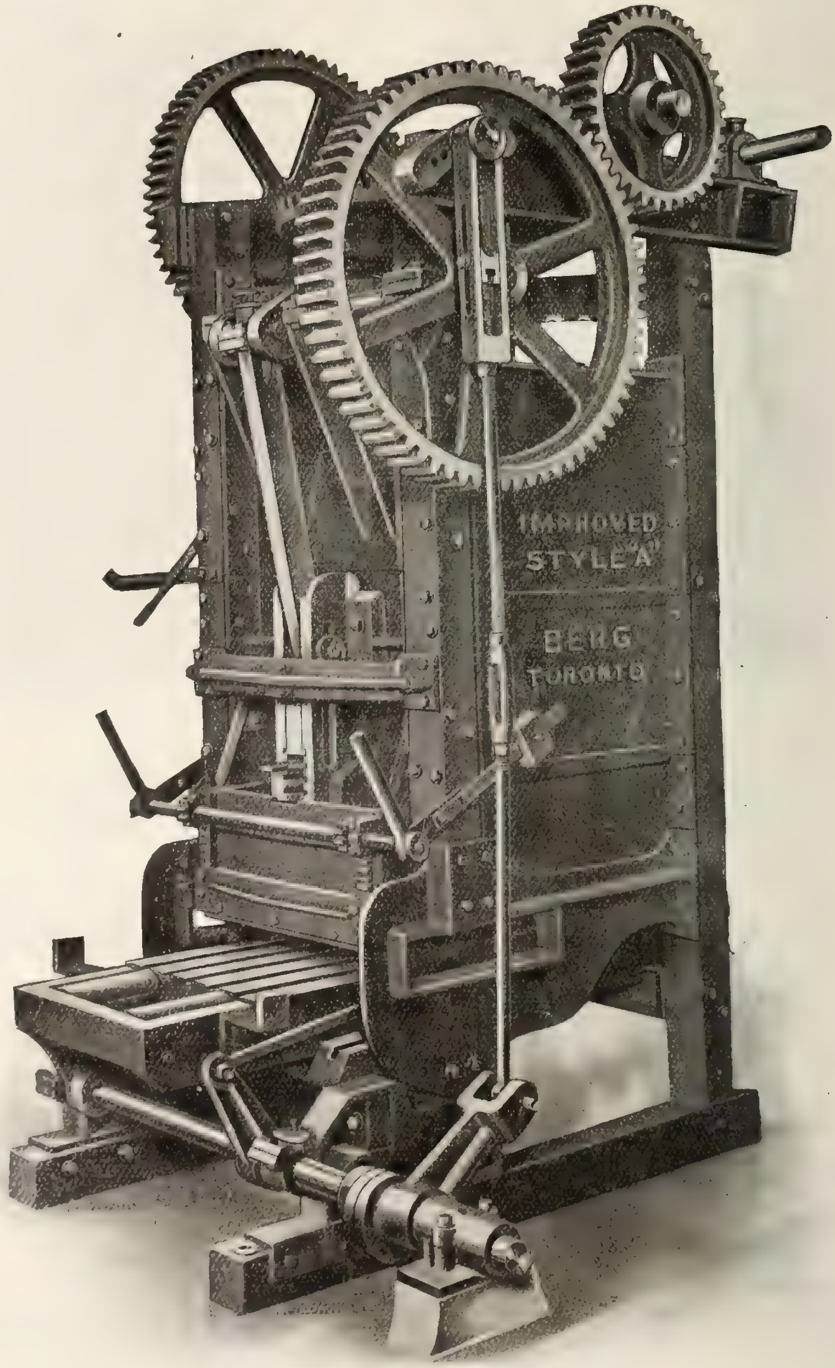
Improved Style "A" Power Brick Machine



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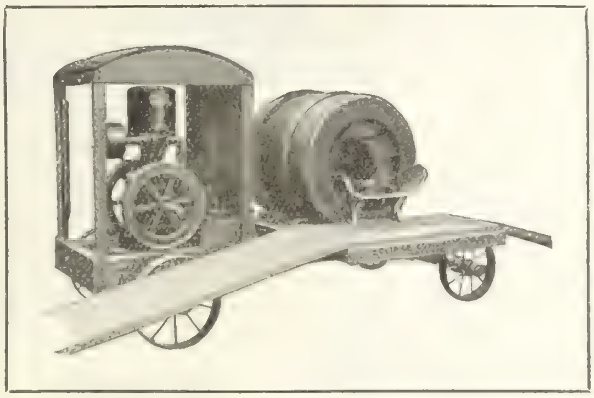
"The Standard" Batch Mixer



Low Charging

What are the substantial reasons for the enviable position of "The Standard" Low Charging Concrete Mixer?

What is the source of enthusiasm which every contractor and user has for "The Standard" Batch Mixer?

What qualities does it possess which compel the contractor, after having used "The Standard" to consider no other mixer

What advantage does the contractor using "The Standard" enjoy day by day which convinces him that he has the best mixer?

What causes contractors using "The Standard" to report that they would not exchange for any other mixer, no difference what the price.

What is the explanation for contractors everywhere ordering "The Standard" Low Charging Concrete Mixer, frequently exchanging or discarding other machines costing two and three times as much.

Low Charging—Simplicity—Results

"The Standard" patented Low Charging open drum, whereby the materials are charged into the mixer from a low platform about two feet from the ground, is, perhaps, the most important and highly appreciated feature.

"The Standard" simplicity is another of the principal features. Only the mixing drum, simply connected to the power for driving.

"The Standard" open drum, enabling the batch to be inspected while mixing results in high grade uniform concrete.

"The Standard" patented semi-automatic discharge is operated from either end of the drum.

"The Standard" simple equipment is built compact and light and can be moved to the best mixing location on the job in a moment's time.

"The Standard" easy of access to all parts, including interior of the mixing drum.

"The Standard" moderate size outfit, has surprisingly large mixing capacity per day. Not necessary to purchase big machines.

"The Standard" can usually be placed in cars for shipment without taking apart except removing platform, which is held by four bolts

"The Standard" weight is not excessive and transportation charges by freight or drayage are reduced to a minimum.

"The Standard" is economical in first cost as well as economical in operating cost.

"The Standard" all regular sizes in stock at factory, warehouses and agencies ready for immediate shipment.

The Standard" special designs to meet particular requirements often afford great saving in operation.

"The Standard" built in capacities two to forty cubic feet per batch, twenty to three hundred cubic yards per day.

Advantages Which the Contractor Enjoys and Disadvantages Which He Escapes When Using "The Standard" Batch Mixer

"The Standard" is low charging. The materials are charged into the mixer from platform about two feet from the ground, avoiding building high platforms with long runways or purchasing complicated charging hoists and hopper arrangements.

"The Standard" simple construction is always ready for use, and avoids frequent break downs, so common with all complicated machinery, especially when subject to rough usage around building operations.

"The Standard" discharging arrangement simply operated from either end of the drum, saves extra man required with other machines.

"The Standard" easy running avoiding unnecessary friction, requires less power, less fuel and less attendance.

"The Standard" moderate weight machine can be easily moved from job to job, avoiding excessive freight charges or heavy hauling expense. The moderate weight machine can also be located any place on the job, often avoiding much manual labor.

"The Standard" special designs to meet peculiar requirements frequently saves heavy expenses.

The contractor using "The Standard" Batch Mixer will find he enjoys numerous other advantages and escapes many additional disadvantages.

If you wish to know more about "The Standard" write for catalogue No. 245. It will be of value to you

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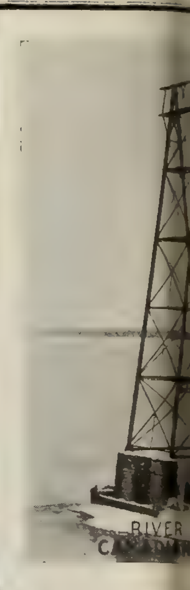

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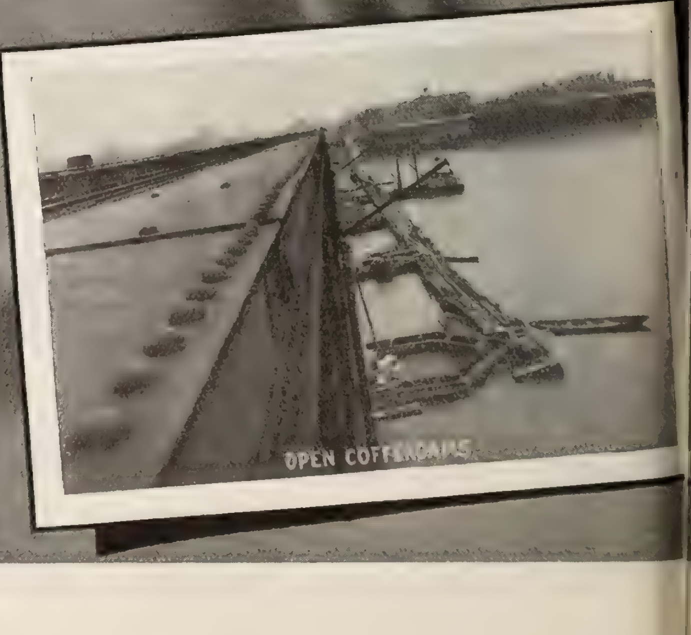

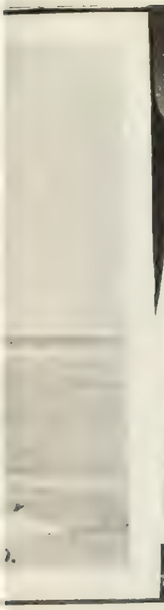

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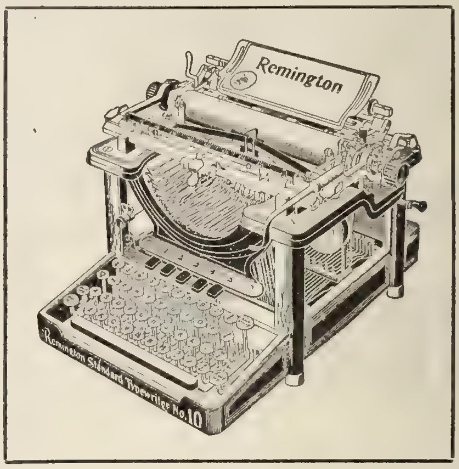

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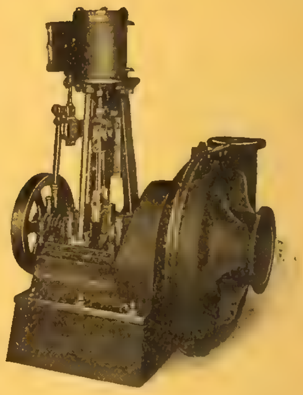

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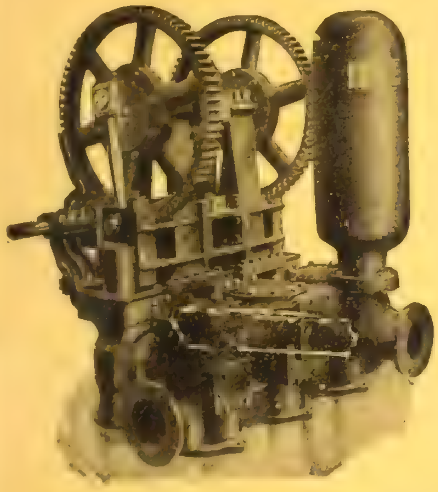

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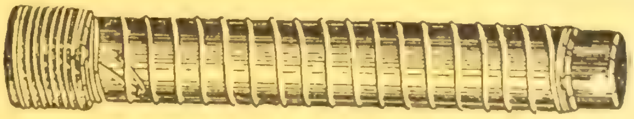

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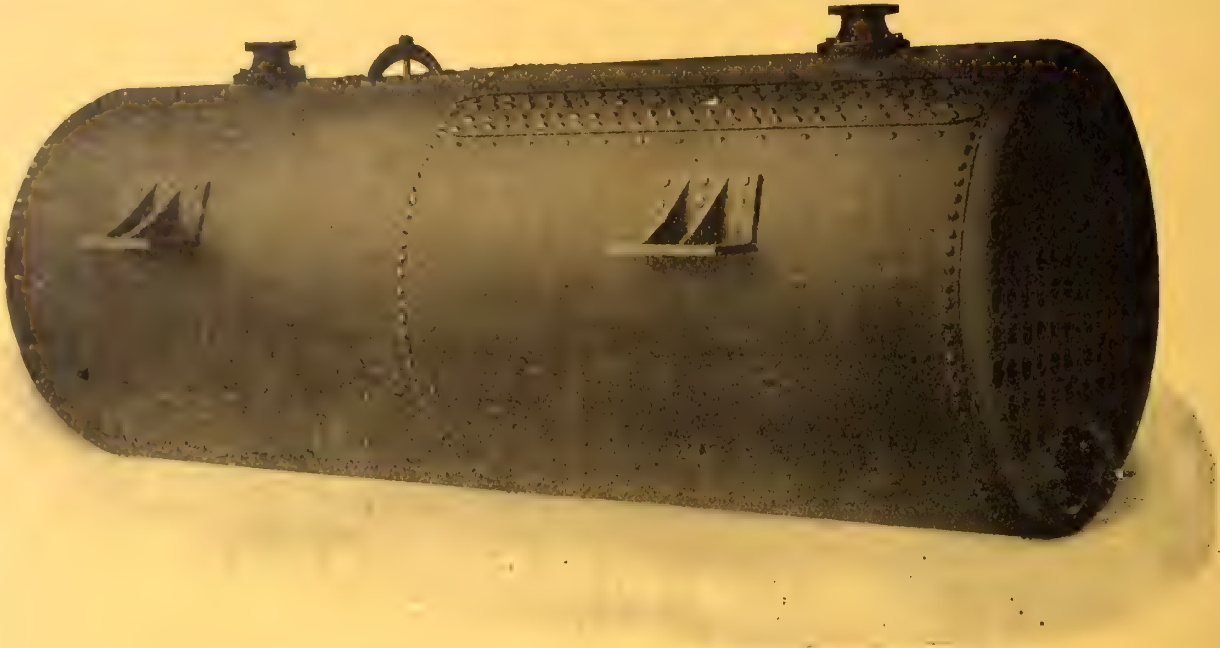

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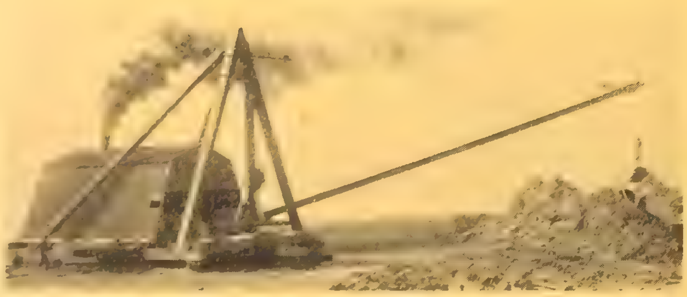

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THIS handbook of practical information on modern fireproof construction was compiled—at great expense—to fill a real want, to supply reliable data on a subject in which every architect, engineer, contractor or prospective builder is intensely interested.

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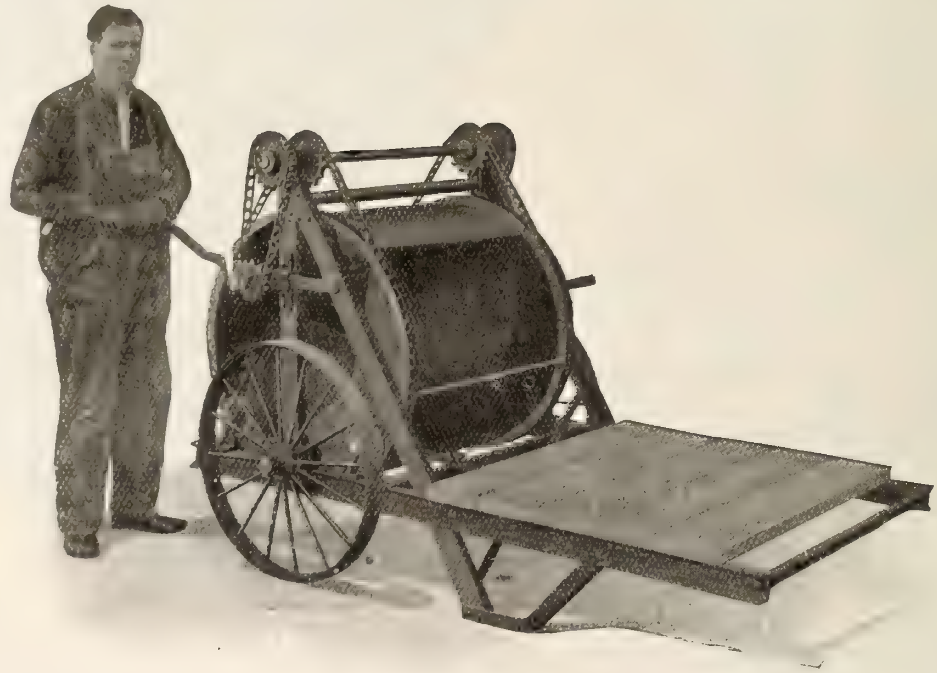

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Loading platform is only 15 inches from the ground. Machine weighs 850 pounds, well balanced on strong wheels.

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to you.

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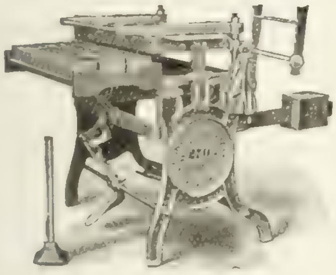
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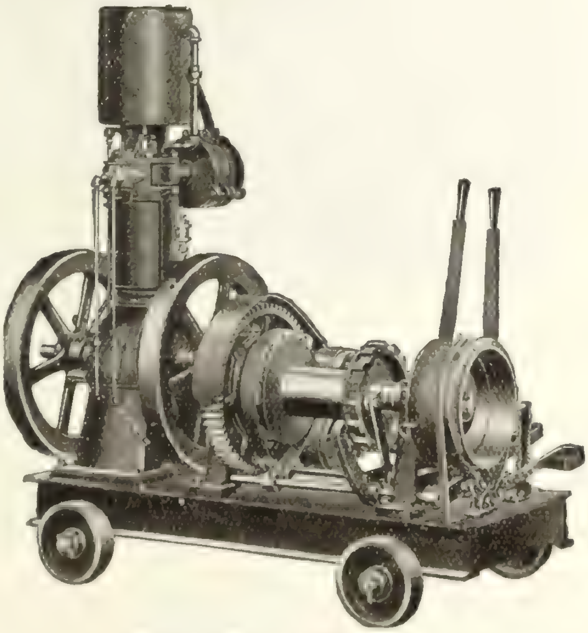
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While we are BUILDING MACHINES we are BUILDING our REPUTATION.

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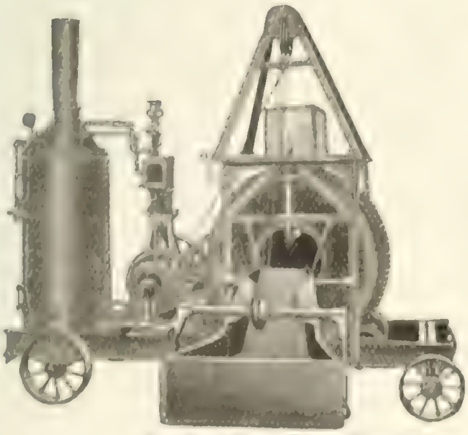
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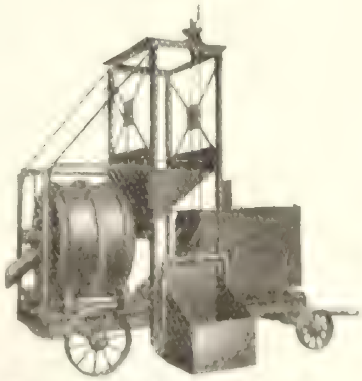
We manufacture a full line of CONCRETE MACHINERY and Cement WORKING TOOLS, also CONTRACTORS' MACHINERY and EQUIPMENT.


Paving Machine with Side Loader

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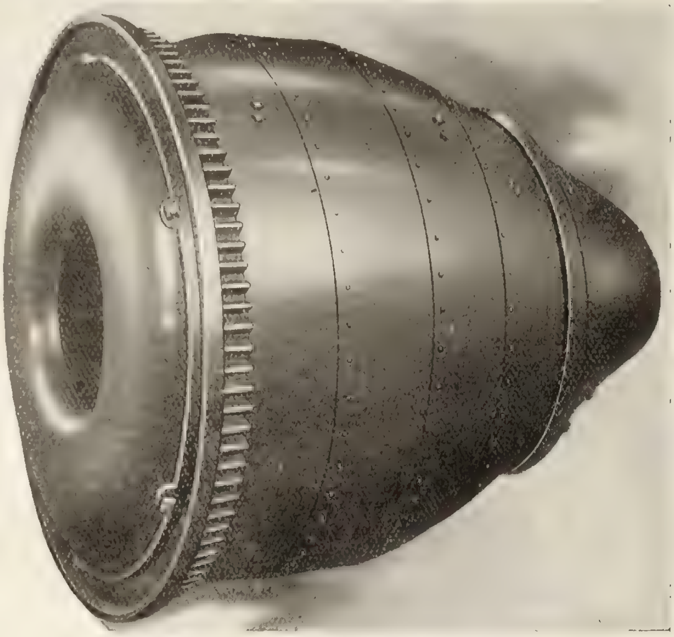
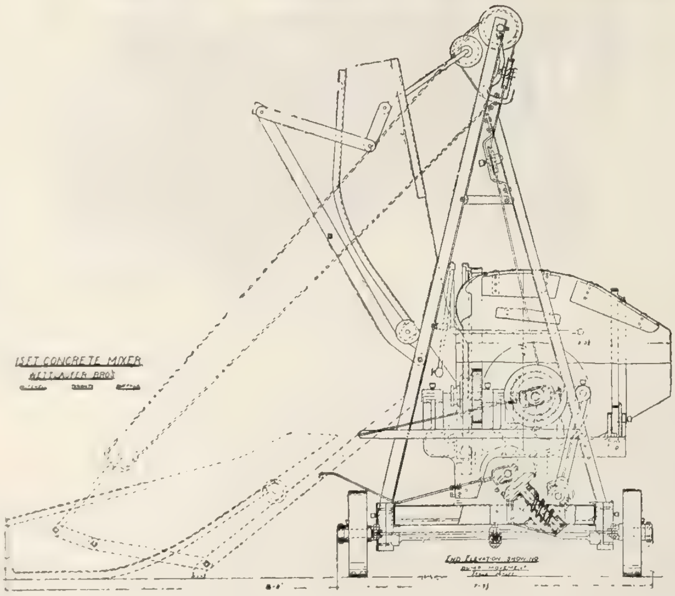
This new improved patent "Heartshape" drum turns the batch end for end. It thus ENSURES a QUICK and POSITIVE mix.

This shape of drum makes an even distribution of the weight of the batch of concrete thereby lessening the strain on any particular point.



Every detail of the design and construction of this "Heartshape" drum makes for great strength and long life. The wide overlap in the seams as shown in the cut gives it 100% more strength and makes wearing-out almost an impossibility. TEST AFTER TEST HAS PROVED ITS EFFICIENCY.

This front elevation of our Nos. 5 & 6 Mixers show the automatic hopper ready to receive material, also discharging into the drum. Note compactness, simplicity and few parts.



The absence of all complicated working parts in the Wettlaufer "Heartshape" Mixer reduces the liability of a breakdown to a minimum, and renders it easy to control. THE ENTIRE MACHINE IS OPERATED BY ONE MAN.

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

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We can give guarantees of delivery at present, and will accept a certain number of contracts now, with guaranteed delivery dates. Wire, phone, or write these orders now.

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Good Portland Cement

Write for Quotations and Particulars.

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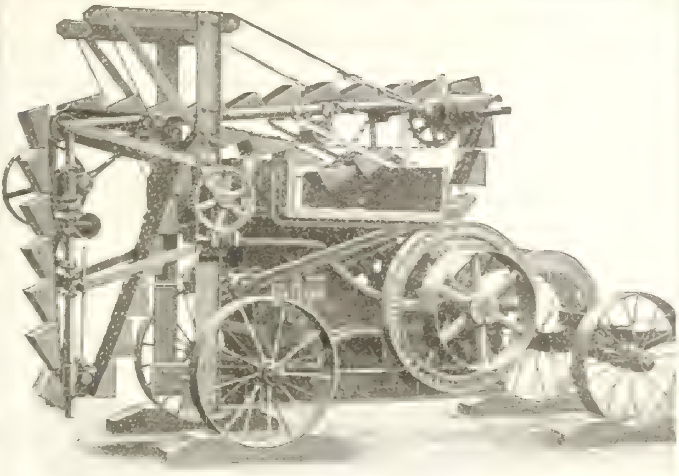

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Its compact form combines great strength with light weight, making it very portable, and **specially adapted for contractors' use.** Strongest and most durable crusher on the market combining maximum product with minimum power. Adjustable to various sized stone. *Get our Special [illegible]*

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"HAGERSVILLE"
CRUSHED STONE
FOR
CONCRETE AND MACADAM

The Toughest Stone for
Macadam in Ontario.

Offices and Quarries: HAGERSVILLE, ONT.

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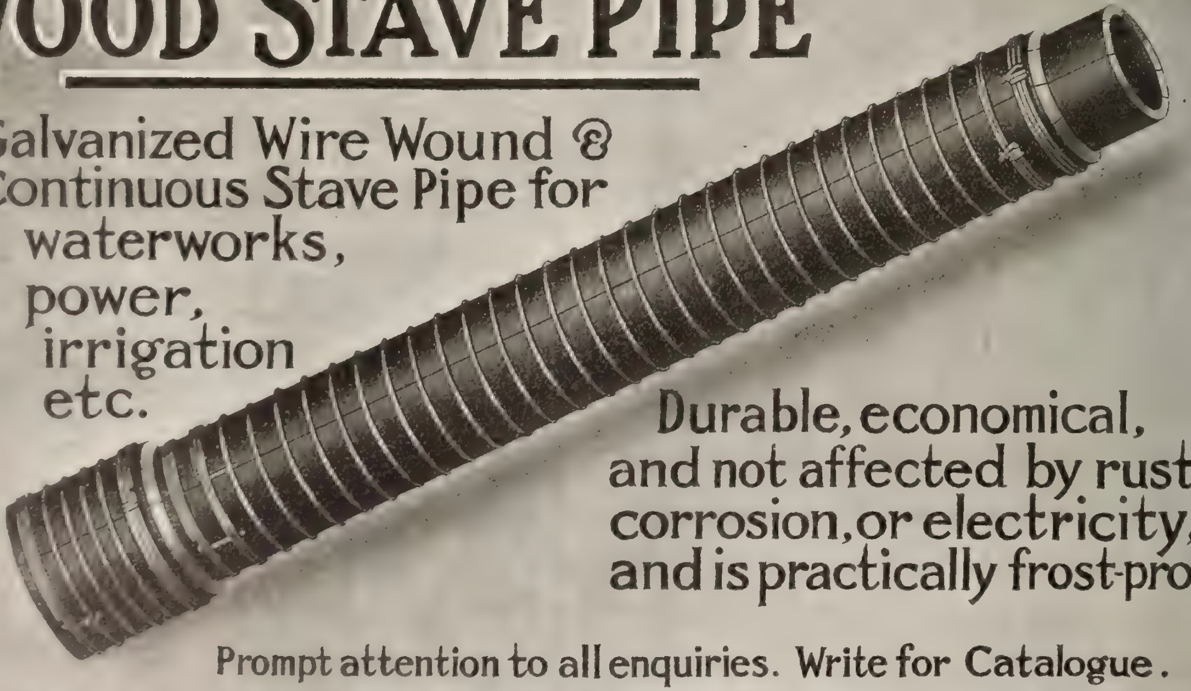
Galvanized Wire Wound & Continuous Stave Pipe for waterworks, power, irrigation etc.



Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

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Our Claims for Roman Stone

In appearance it is quite equal to natural stone. In actual wearing qualities it is far superior to many natural building stones.

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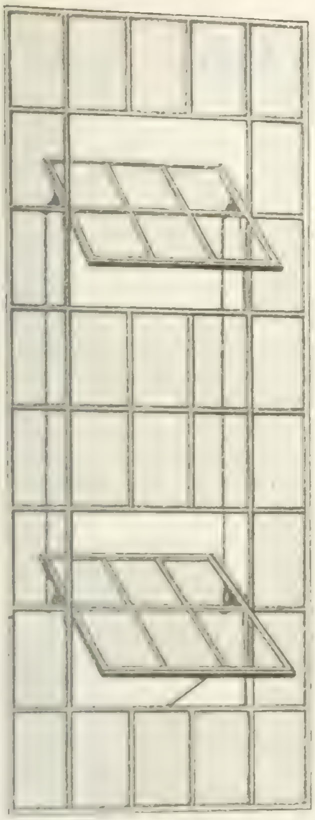

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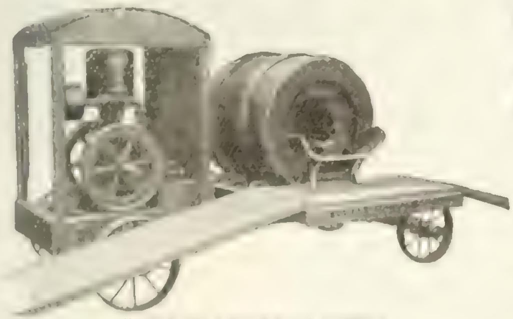

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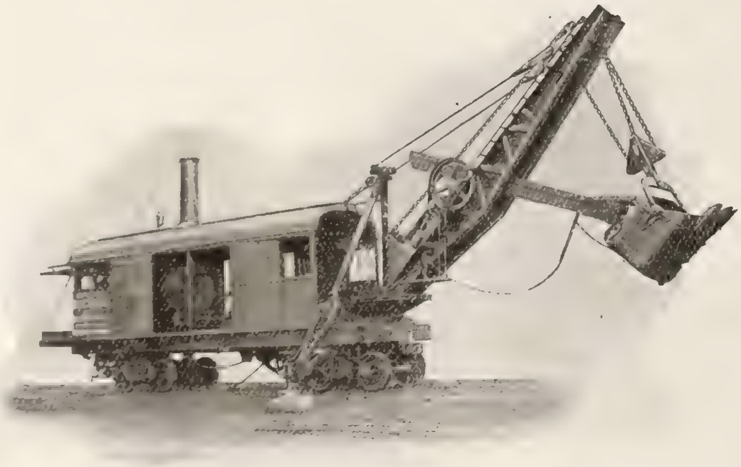

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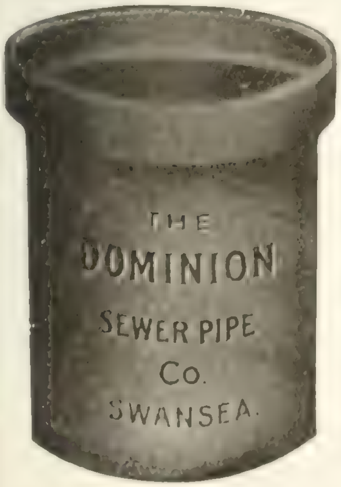

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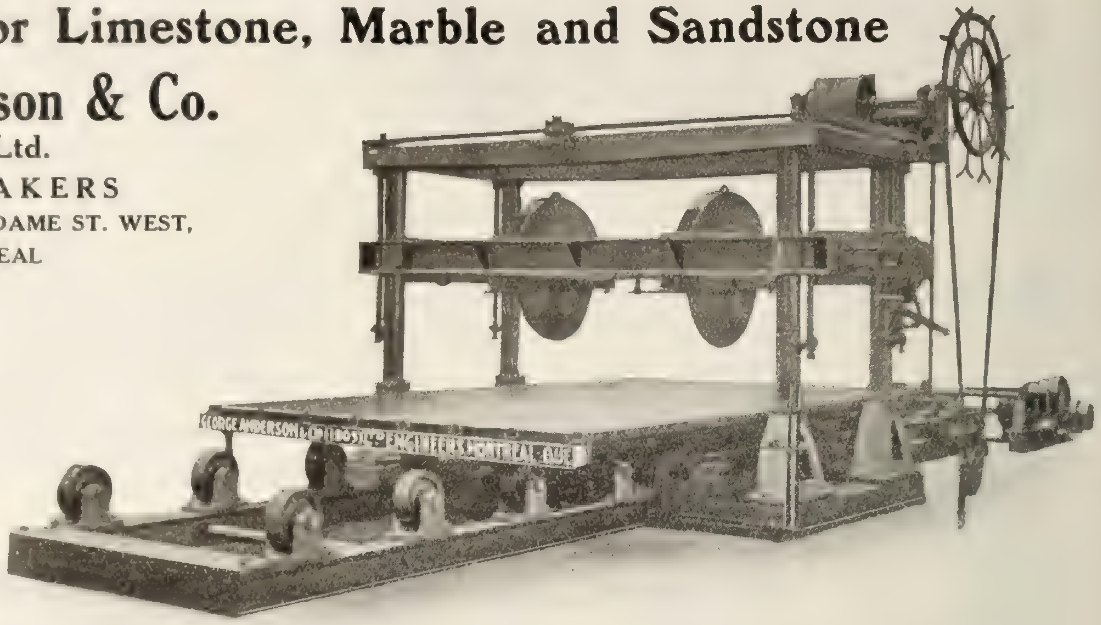

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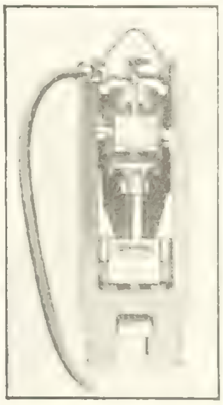

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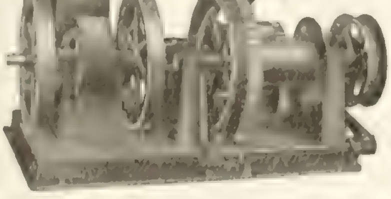

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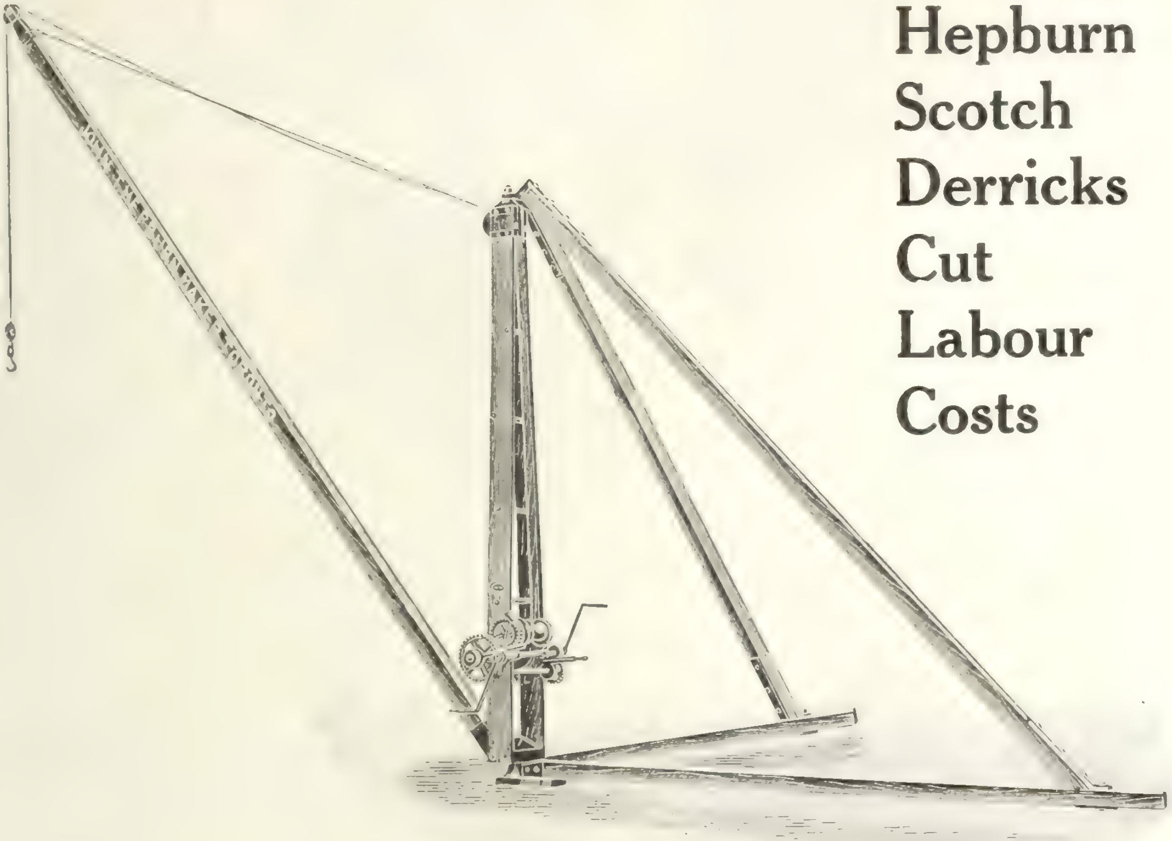
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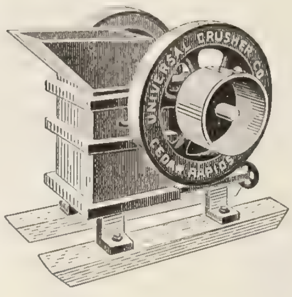

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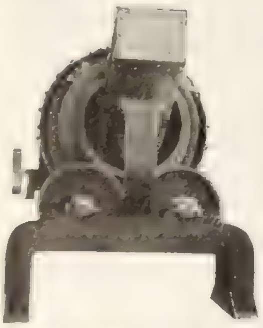

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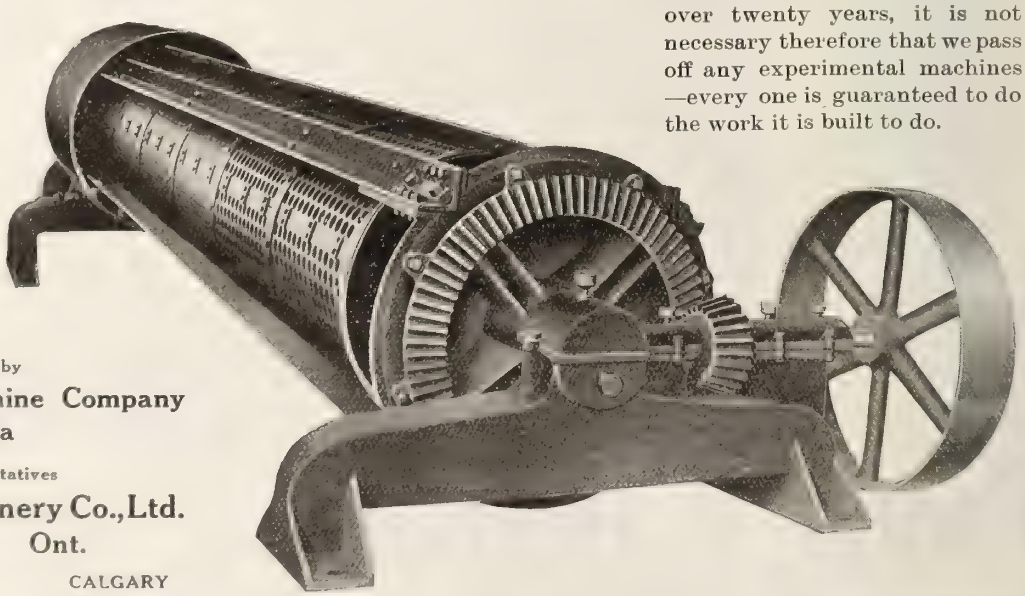

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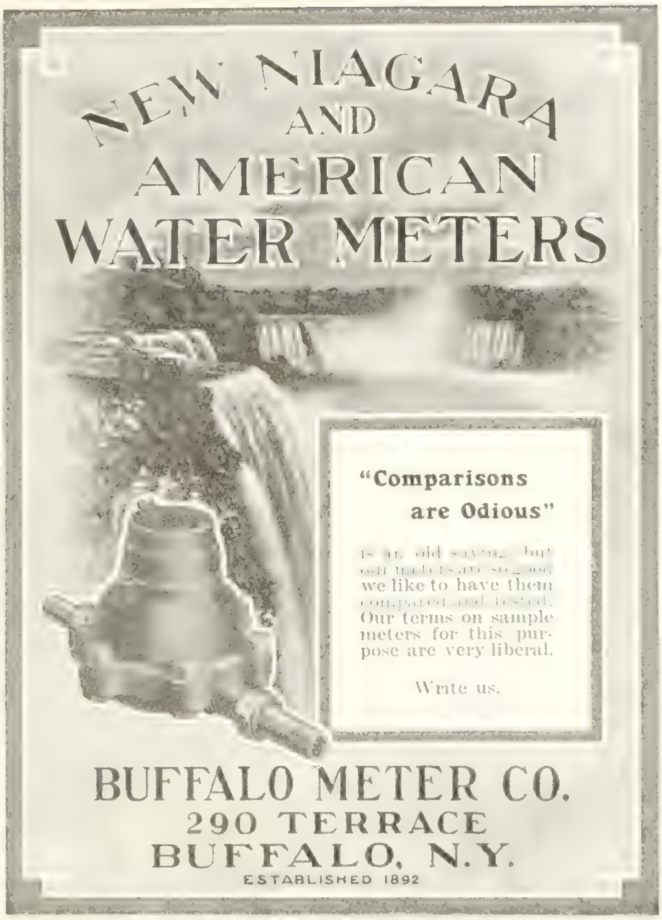

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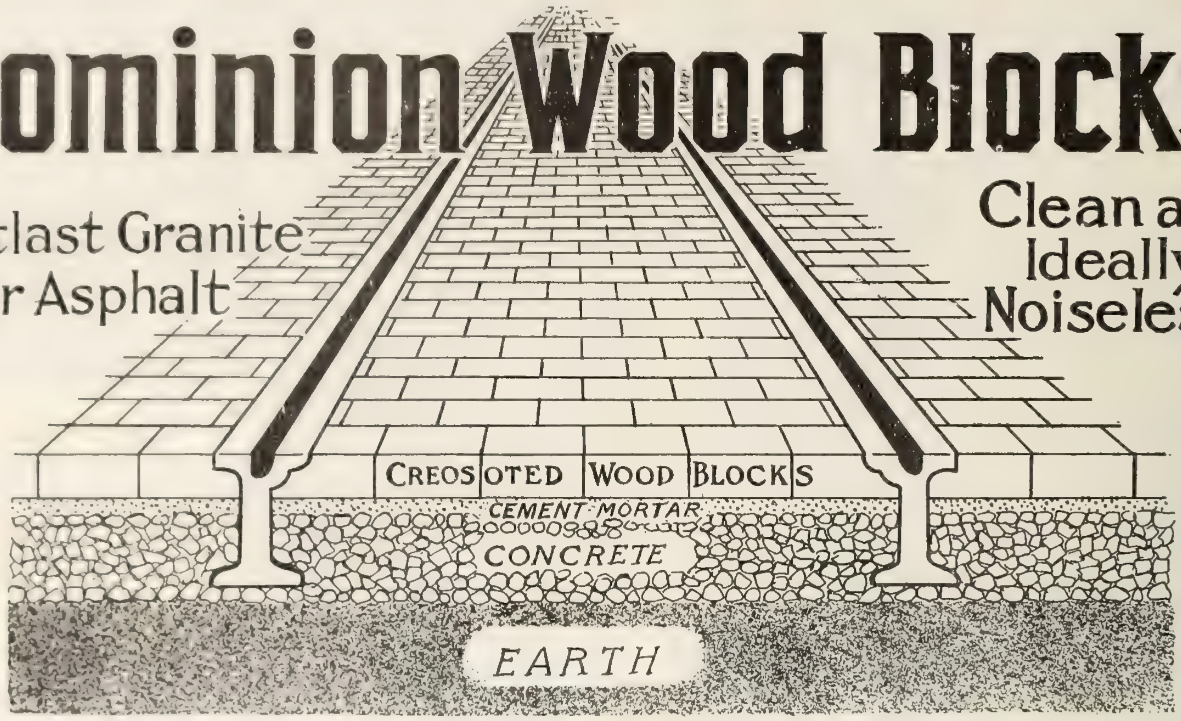

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May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

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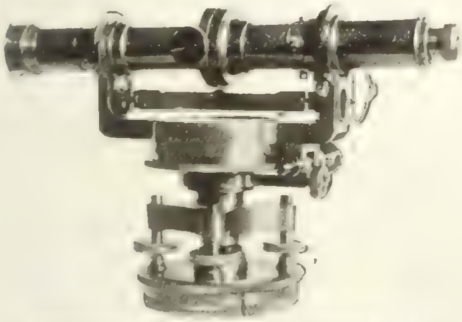

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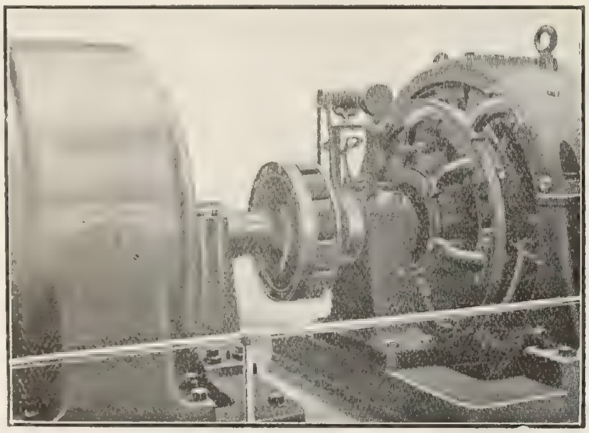

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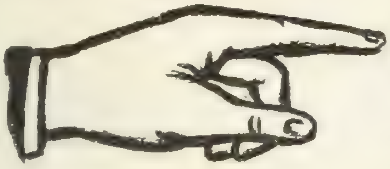

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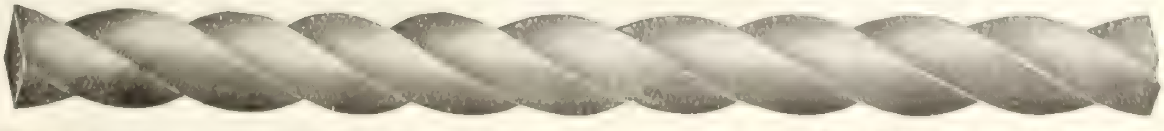

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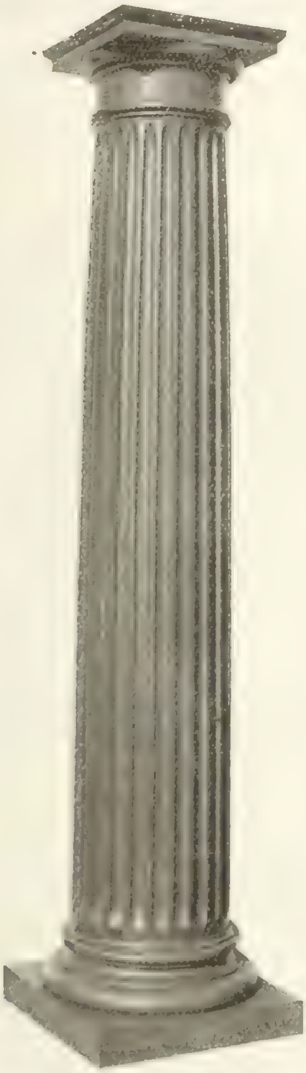

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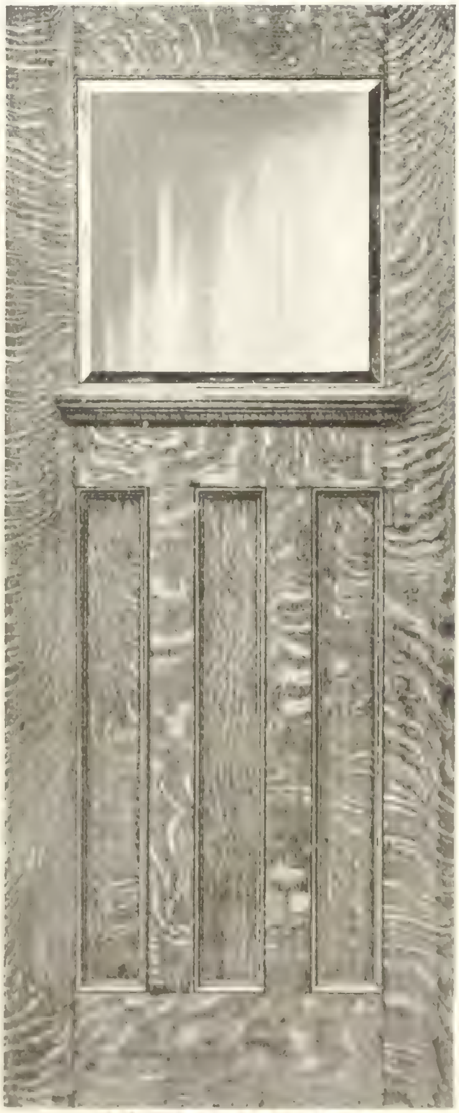

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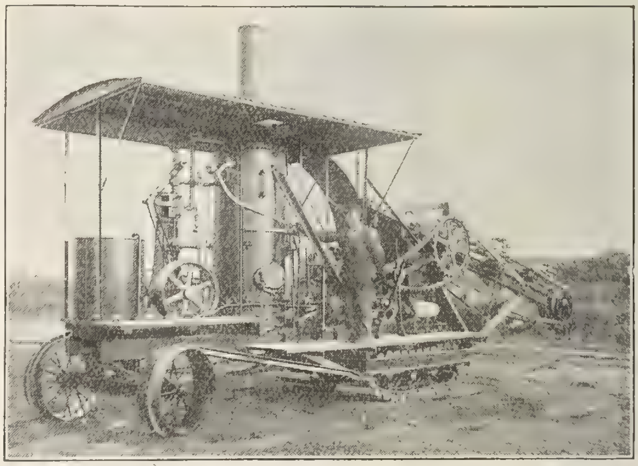

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Full details in catalogue No. 208. Ask for it.

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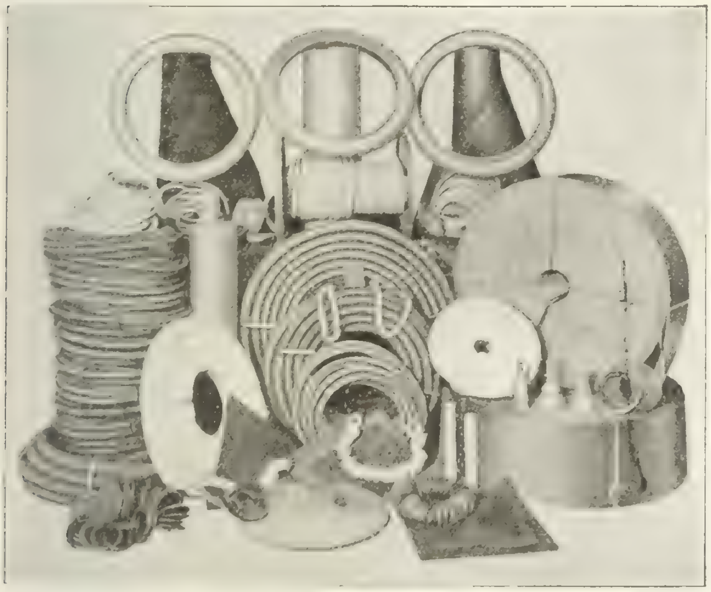

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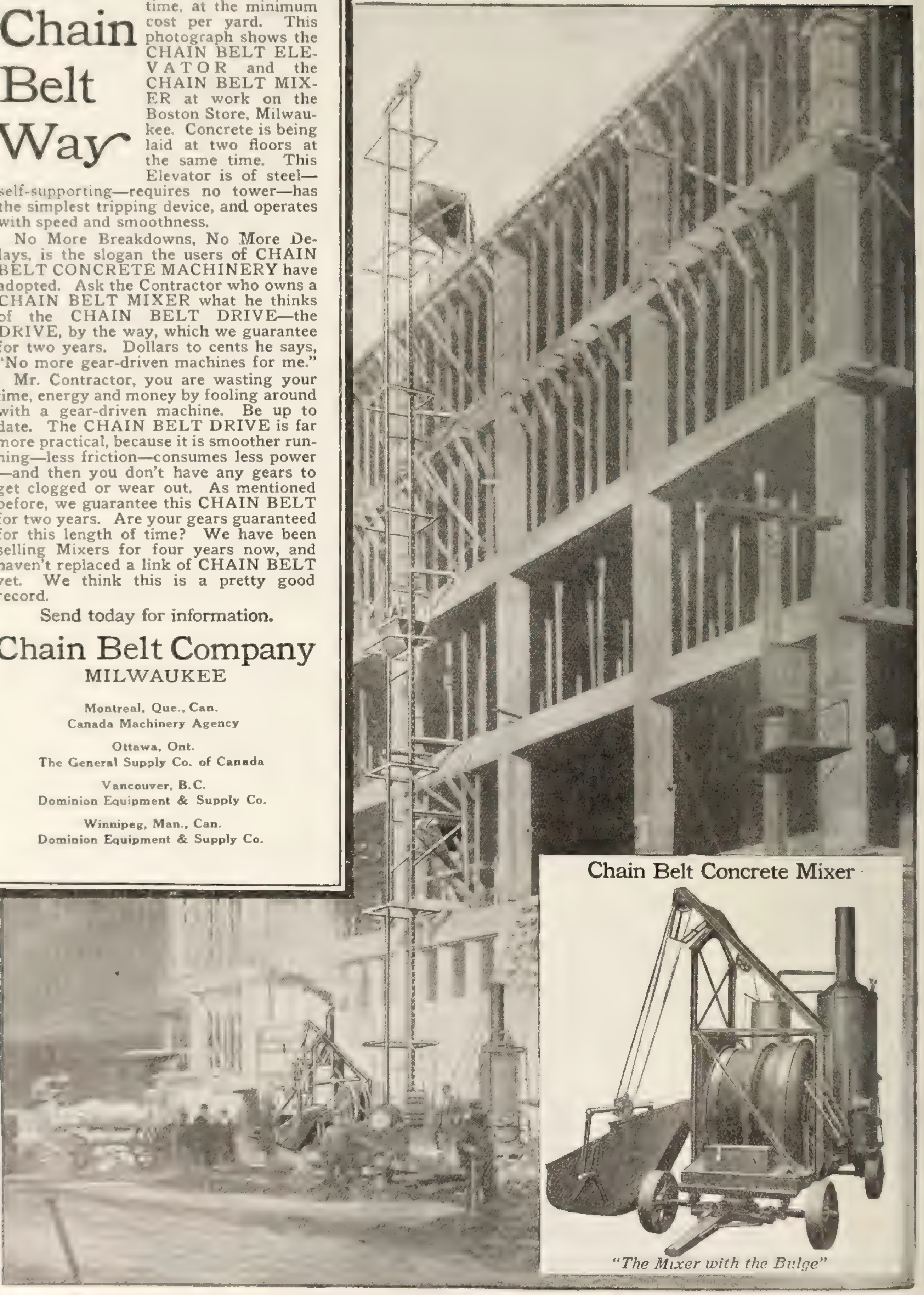

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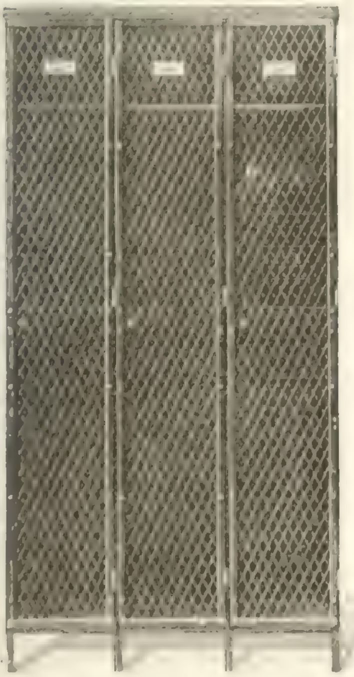

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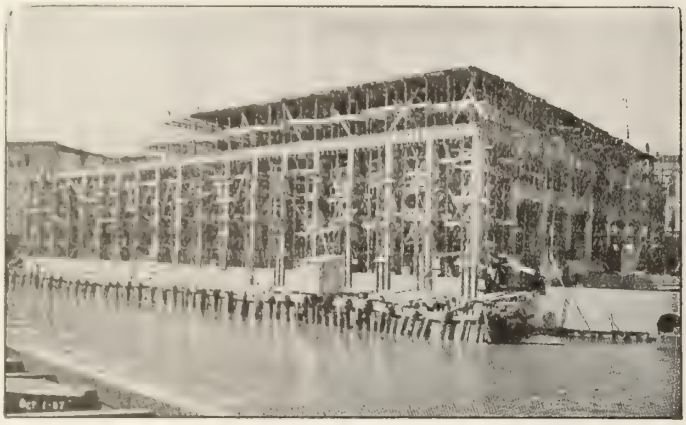

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Alphabetical Index of Advertisers
Page 16

Vol. 26 **April 10, 1912** **No. 15**

Merits and Demerits of Scientific Management

SCIENTIFIC MANAGEMENT has come in for such a considerable amount of discussion in recent years that Mr. Gilbreth's paper delivered recently at the University of Toronto and reproduced elsewhere in this issue cannot fail to be productive of interest. Mr. Gilbreth has given a great deal of thought to this study and undoubtedly his systematic methods have effected a considerable saving and resulted in greater efficiency where they have been employed in many large organizations. Presumptuous though it may seem, however, we have a not altogether unmixed regard for the degree of scientific management advocated by Mr. Gilbreth. System, like many other good things, applied to excess "begets peculiar pain." Management, if too "scientific," too systematic,—perhaps we should say too machine-like—becomes a tyrannous reversal to feudal conditions. Any science or system of management which reduces men to a dead level is harmful. Men were endowed with varying intellects and varying capabilities for work with the evident plan of one excelling the other. In spite of the influence wielded by the labor organizations of the world we are optimistic enough to believe that their scope has a well defined limit, the reason being that they are one of the factors whose influence makes for standardization, and it is not in human nature for men to be standardized like machines. Not that we would go on record as being opposed to studying and improving systems of management, for undoubtedly the intelligent laying out of work and distribution of authority, centralizing in one head, is one of the fundamentals in the successful organization of any large firm. But to the serious development of anything like "motion study" we are opposed. Mr. Gilbreth may have had "unusual success with teaching boys and men the right motions first and then the right motions with increasing speed until the maximum speed was reached," but Mr. Gilbreth must have had unusual material to work upon. And then of course he is an unusual organizer. He is one of a thousand, perhaps, who could put his own methods into successful operation.

It is unreasonable to expect men to do good work for any length of time at the maximum speed, and if a man attains anything like machine-like precision his intellect is soon on a par with a machine. In whatever way efficiency may be obtained we do not believe that it will be by making machines of men. It is practically impossible to get a reasonable day's work by a stop watch. It can only be determined by practical experience and intelligent observation. Moreover, in the successful operation of any method or methods it is essential for both employer and employee to be working towards one end. On both sides there must be a disposition to co-operate. Any intelligent workman worth keeping will resent the introduction of a system which deals with him as a beast of burden or a machine. After all, this spirit of co-operation between employer and employed is not the result of any particular system of management, but is due almost entirely to the personality of the management and employee and the spirit that prevails in their relations to each other.

Similar operations on similar work can be advantageously done in a similar way. It is a great waste of effort and thought to perform one operation in one way to-day and in another way to-morrow. But standardizing can be carried too far. When standardization has reached the point that the cost of maintaining it is greater than the saving resulting therefrom, it should be discontinued. It is an important point that with much of this scientific management there is so much detail work that the overhead charges incurred are more than likely to exceed the material benefit derived from the systematizing of the work.

Discussing with the writer the merits of Mr. Gilbreth's methods a member of a prominent Toronto contracting firm expressed the opinion that their main use was to train students to be systematic in their habits, but that their application to the operations of large contractors was impracticable for the reason that a hundred and one unforeseen emergencies arising in the course of a day would make such system burdensome.

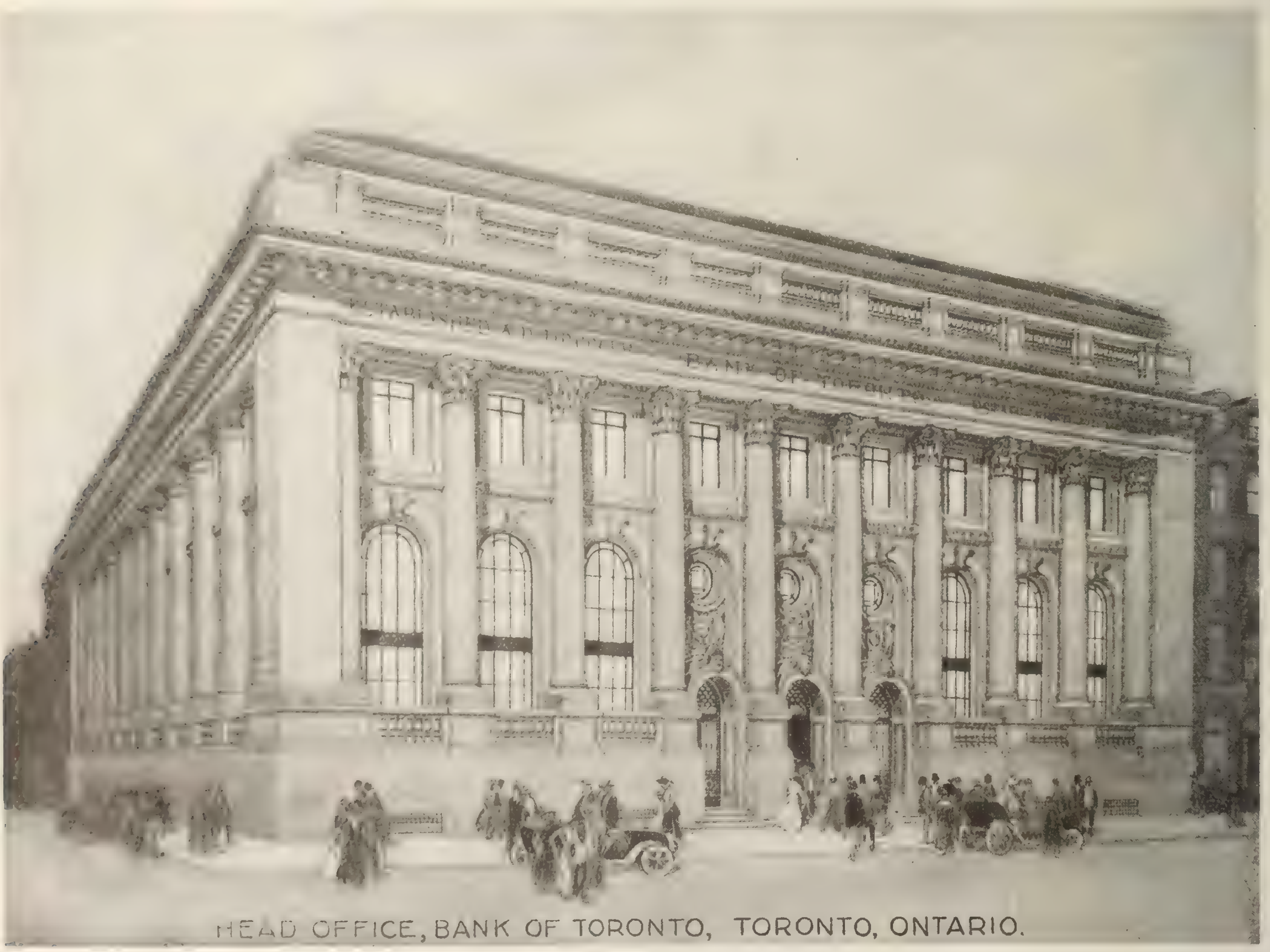
It would seem that in all these methods there is a total disregard for human contingencies and these constitute an important factor in every business. Personally, we would aim at scientific management only in so far as it provided for systematization of work and the methodical planning thereof.

The Canadian Northern Railroad are entering upon a heavy construction programme this season. The year's work will include the opening up of 1,053 miles of new road. Nearly 14,000 men are at present engaged by the company, and later on this number will be augmented to 25,000. Next year the work will be even more extensive. One of the ietms for 1913 is the completion of the rtanscontinental line from Montreal to Vancouver. To complete the Ottawa-Montreal section the company will build this year from Montreal to Hawkesbury, a stretch of 58 miles. Nearly 1,000 miles will be built by the company next year in the completion of the transcontintntal line.

New Head Offices of the Bank of Toronto

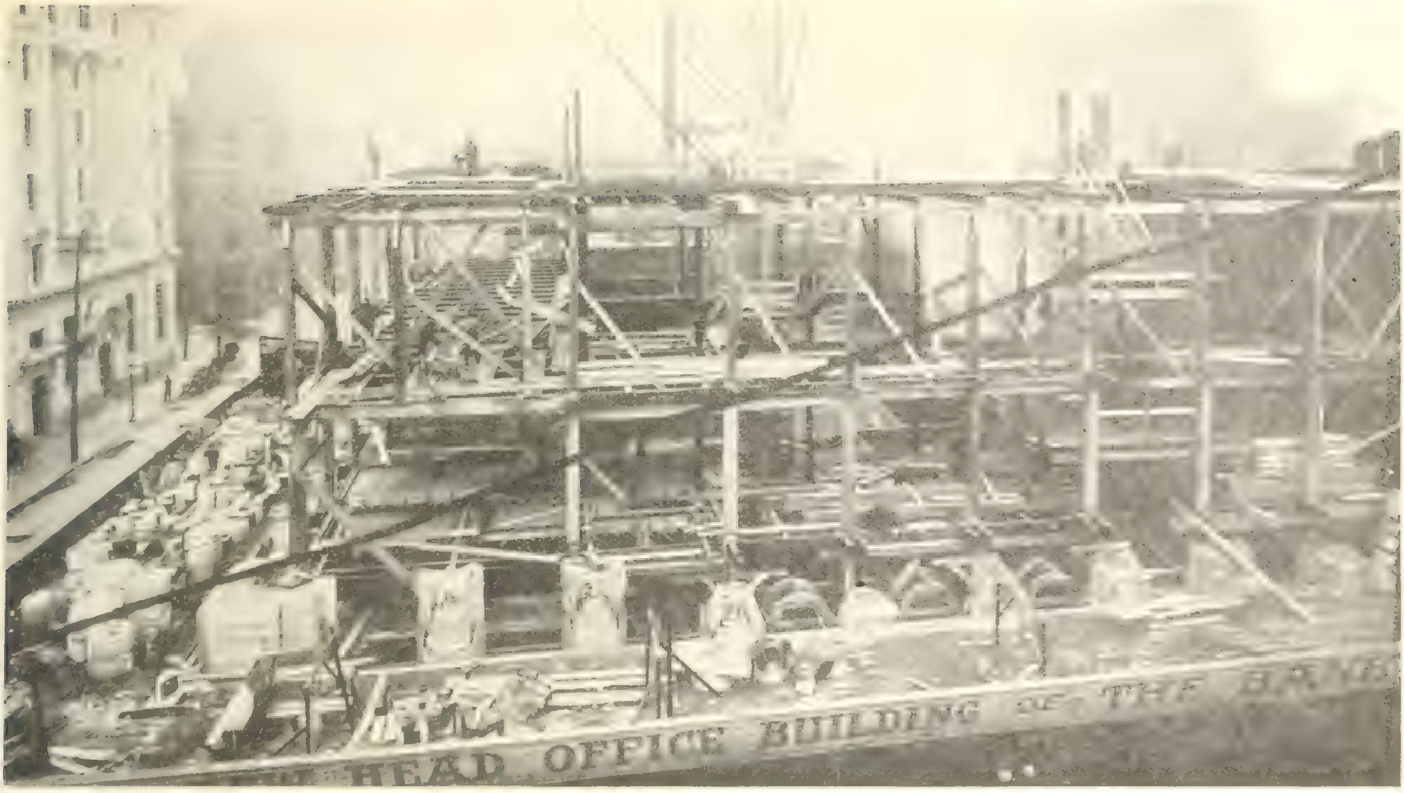
One of the Queen City's Latest and Greatest Building Acquisitions Noteworthy Features of the General Design and Construction

THE head office building of the Bank of Toronto, which is now being erected at the corner of King and Bay streets, Toronto, by The Norcross Bros. Company, Limited, will be a particularly imposing and dignified structure and will rank with the Montreal and Winnipeg offices of the Bank of Montreal as one of the outstanding buildings of this class in the country. Operations were commenced in March, 1911, and the construction is now reaching a stage where the progress of the work is being followed with a well defined interest. The design of the building is inspired by the Corinthian style. The above illustration is reproduced from the perspective made by the architects, Messrs. Carrere & Hastings, of New York, with whom is associated Mr. Eustace G. Bird, of Toronto.



HEAD OFFICE, BANK OF TORONTO, TORONTO, ONTARIO.

The exterior of the building is executed in Tennessee marble, which is particularly noteworthy on account of the elaborate carving which is entering into the work. In this branch a force of nearly twenty men has been employed under the direction of Messrs. Ardolino Bros. at Messrs. Norcross Bros.' mill at Logan avenue, Toronto. In one of the accompanying illustrations there is shown one of the twenty-one capitals required for the columns. For these elaborately carved capitals it is necessary to make equally elaborate plaster models, while the artisans employed on the work must be not only skilled but must have a degree of artistic sense. The dimensions of these capitals conform to the particular style of architecture and are true to the dimensions called for by the size of the supporting columns. Another feature of this work which will go to make the new Bank of Toronto perhaps the most ornate building of its kind in the country, are the sculptured panels over the main entrance, which will stand as a permanent monument to architectural taste and sculptural skill. Mr. Edward Ardolino, who has executed many noteworthy contracts of this kind in Canada and the United States, is shown in one of the photographs reproduced on page 42.



General View of Construction on the New Bank of Toronto

Canadian marble is employed for the sills of the exterior court at the rear of the building and for a portion of the interior light court.

The building is an excellent example of the best type of fireproof construction, having steel frame, floors of reinforced concrete, and terra cotta partitions. The copper roof is laid on a reinforced base supported by steel beams.

There will be four storeys above the ground level and two below, the latter consisting of a basement

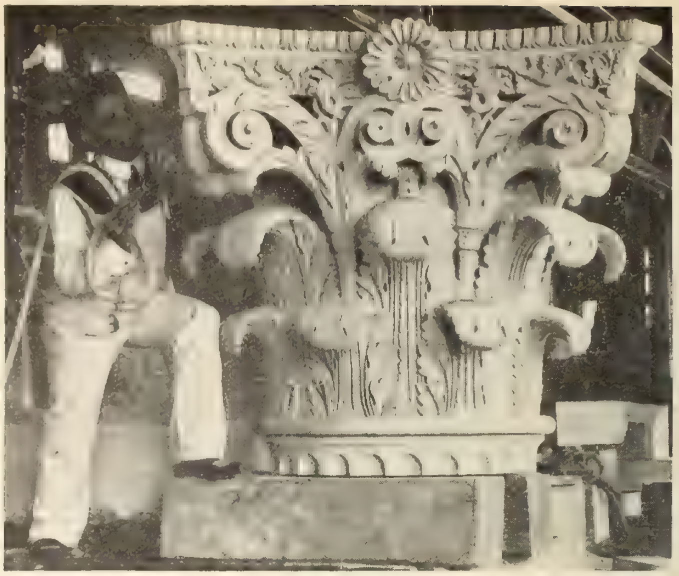
Six Weeks' Progress in Winter Operations and sub-basement. The foundations are built of heavy concrete between five and six feet in thickness and are put in to the depth of about thirty feet. An interesting feature of the construction incidental to the foundation work was the underpinning of the adjoining buildings on King and Bay streets. These were underpinned with brick masonry to the full depth of the main foundations.

The concrete paving in the sub-basement consists of a 2-in. levelling course of concrete, an 8-in. course of broken stone, a 2-in. course of concrete screened off smooth, a 4-inch layer course of waterproofing, and a 3-inch course of concrete screeded off smooth at proper levels to receive the various finished floors. Within the 8-inch course of broken stone, just inside of all the exterior walls, there is a continuous sub-soil drain of salt-glazed hub and spigot tile pipe, five inches in diameter, laid with loose joints and discharging into the sump pit.

During the progress of the winter operations the contractors used temporary supports of wood for the steel beams which were finally to be carried on the masonry walls as the marble was cut. These were removed upon the completion of the masonry for each storey.

The interior equipment of the building, which we hope to describe in detail at a later date, will be most complete and elaborate. The ground floor and mezzanine floor will be finished in various kinds of imported marble, including Botticino, grey Tennessee, Cenere, Touraine, Danby and Dorset "B," the two last named being from the Norcross quarries in Vermont. A large quantity of heavy and elaborate bronze work will be used for various purposes, including the railing around the mezzanine gallery and also the dome over the main banking room. Immediately above the dome, and at the second floor level, there will be a roof garden, the floor of which will be built with reinforced vault lights. In the basement and sub-basement are located boiler and engine rooms, which will be finished with white enamelled bricks. Certain passages in the building will be finished in tile with marble base.

Concrete Foundation on King Street, showing necessary shoring for earth banks.



One of the 21 Carved Capitals, with the Sculptor, Mr. Edward Ardolino

On the ground floor the space available for banking purposes is approximately 10,000 square feet, exclusive of the space taken up by the vaults. The building will be devoted exclusively to the business of the Bank of Toronto. The mezzanine and second floors will be occupied by the offices and board rooms of the directors and officers of the bank, while accommodation provided on the second floor includes commodious lunch rooms for the directors and clerks, and also quarters for the caretaker.

The heating, ventilating, plumbing, electrical and vacuum systems installed will be of the most modern and approved types, and each has been designed to meet the special requirements of the building. There will be three plunger elevators. The elevator grilles and balustrades will be of bronze and ornamental iron. These materials used in conjunction with the marble will present a very rich appearance.

Extending from the sub-basement up to the second floor is a complete system of vaults. These structures are built of brick. The more important vaults will be heavily lined with three inches of steel.

In the preparation of this material we have been indebted to Mr. C. E. Palmer, Superintendent of Construction for Messrs. Norcross Bros., and also to Mr. J. E. Brainard, who has charge of the engineering details for the same firm.

The contractors have a very complete line of equipment at the scene of operations. Mr. James Meikle, foreman, and Mr. F. A. Lapham, financial agent for Messrs. Norcross Bros., have an efficient and steady force of men under their direction, and under the present favorable conditions it is hoped to complete the building by the latter part of the present year.

The directors of the Grand Trunk Railway will meet in London on April 18th to consider the matter of exercising the powers conferred upon them by the Grand Trunk Act of 1912 to raise $30,000,000 for construction work.

Cost of Maintaining Anchored and Unanchored Track

The relative cost of maintenance of unanchored track and track anchored to prevent creeping of ties is shown in an article in the Railway Age Gazette. The data are taken from records made on the maintenance of 3½ miles of double tangent track of level grade, light gravel ballast, 85 lb. rail and broken joints. The heavy traffic was north bound and consequently all data are based on the north bound track, as the creeping tendency here was decided. This track had been put in service 14 months before, and one mile in the centre of the stretch was anchored, leaving 1½ miles on the north and one mile on the south end not anchored. Where the track was anchored, 640 anti-creepers were applied, two per rail length, opposite joints against opposite end of joint ties. The anti-creepers have received no maintenance and have shown no failure, although they had been in service 14 months at the time of inspection.

The character of the work done on the two pieces of track in 14 months is stated in the columns below:

Anchored Track—
Track resurfaced once.
Unanchored Track—
Track resurfaced twice.
Ties spaced twiec.
Rail driven back twice.

The total maintenance cost for the mile where the anti-creepers were applied, including the cost of anti-creepers, is as follows:

Cost of anti-creepers, 640 at 17½c. each	$112.00
Applying 640 anti-creepers at ½c. each	3.20
Resurfacing, 10 men working 16 days, at $1.55 per day	248.00
Total	$363.20

The total cost of the next mile north of the mile where the anti-creepers were applied, subject to the same conditions of traffic, roadbed, etc., but unanchored, is given below:

Cost of resurfacing twice, each time 10 men, 16 days, at $1.55 per day, $248	$496 00
Cost of respacing ties twice, each time 10 men, 17 days, at $1.55 per day, $263.50	527.00
Cost of driving back rail twice, each time 10 men, 2 foremen, 6 days, at $1.55 per day, $111.60	223.20
Total	$1,246.20

This shows a saving in 14 months of $883 in favor of the anchored track.

It will be noted that the original cost of the anti-creepers and of their application have been included in the first 14 months. These costs are properly chargeable over the total number of years anchors are in service, which in all cases is at least as long as the life of the rail on which they are applied. This would make the saving considerably greater than has been estimated. Furthermore, this maintenance cost does not include injury done to ties, spikes and joints, which was considerable where anchors were not applied, as the creeping had pulled the ties badly askew, bending or completely destroying the spikes and often causing broken joints. Where the anti-creepers were applied, this wear and tear were hardly worth considering.

The above figures were obtained directly from the railway, and the roadmaster stated that he could have maintained this 3½ miles of track in better shape with three men less per year had he been allowed to anchor the balance.

The cost of a road in Maine, 12,120 feet long, of the bituminous macadam type, the stone being delivered at 75 cents a ton from the quarry to the site in electric cars, is given as follows by the United States Office of Public Roads: The following data as to the costs of bituminous treatment were obtained: Total amount applied per square yard, 2.21 gal.; cost of applying, 1.25 cents per gal.; rolling, 1.14 cents per square yard; and foreman, 1.53 cents per square yard. The item of applying tar includes the cost of filling the kettle, heating and pouring. Three varieties of tar products and were applied by the penetration method. All were delivered in 50-gal. barrels, heated in kettles, and spread by hand with pouring pots having fan-shaped nozzles. The cost of spreading the stone, including the spreading of the chips on the tar courses, was 20.97 cents per ton. As the contract price for this road was at the rate of $7,930 per mile, exclusive of bituminous material, the total cost to the community per mile would be obtained by adding the cost of the bituminous material, which, at approximately 24 cents per square yard, would be $1,970, making the total cost per mile $9,900, or approximately $1.20 per square yard, for the 14-ft. bituminous-macadam surface. The road, however, was graded 20 feet wide, and the above cost includes all grading and drainage which was incidental to the construction work.

Decreasing the width of a highway bridge to reduce vibration has been partially carried out in the case of the Calvert street bridge in Washington, D.C. Excessive vibration had been caused by traffic on the sidewalks, which are supported on cantilever brackets and to reduce this the railing in the side of the bridge was moved in 5 feet with the intention of doing likewise with the south railing. This was opposed by the traction company on the ground that narrowing the bridge was illegal and their stand was sustained by the court. At present pedestrians are using the roadway with the understanding that it is at their own risk.

The Ontario Agricultural College is again renewing its offer of assistance to farmers in laying out their drainage systems. The Department of Physics has a special staff of Drainage Advisers for this work. There is no charge for the services of these men, the only outlay to the farmer being the travelling expenses, which are low., Anyone wishing to have a drainage survey made should drop a card to the Department of Physics, O. A. C., Guelph, whereupon regular application form will be sent, and later on one of the Department's Drainage Advisers will make the survey.

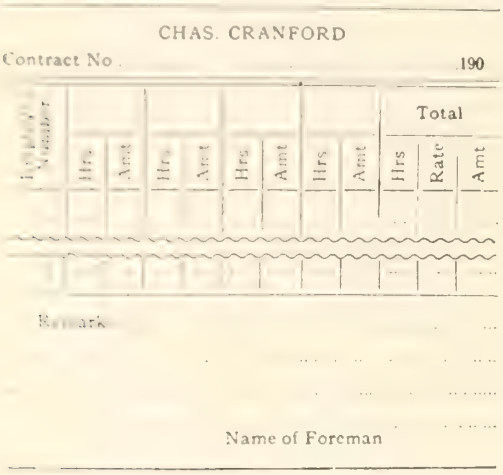
Mr. E. J. Chamberlin, general manager of the Grand Trunk Pacific Railway, states that 6,000 men will be required on the prairie sections of the railway this summer. Part of the constructional programme is the laying of tracks on 610 miles of line which have been awaiting the arrival of steel. The erection of stations also figures large in the work. Last year the company put up 105 new stations.

Organization and Cost in Contract Work

Showing the Value of Cost Analysis and Systematic Records in the Operation of the Contractor's Business

By Richard L. Russell

IN discussing the question of contractors' organization, the consideration of cost-keeping or cost analysis at once becomes important, since the organization may be considered as two divisions: 1st.—the organization necessary to the actual performing of the work of construction; 2nd.—the organization necessary to so record and analyze the cost of the work and the amounts performed, i.e., the unit costs, that the contractor may not only know whether he is coming out with a profit on his contract and may detect excessive costs and correct the same speedily while the work is in progress, but may also have a record that will guide him in bidding on future work.



CHAS. CRANFORD

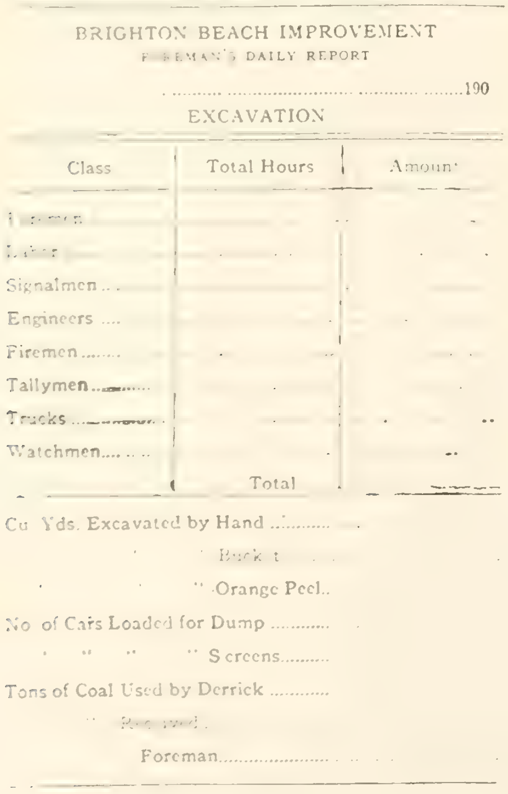
Contract No .190

[illegible]	Hrs.	Amt	Hrs.	Amt	Hrs	Amt	Hrs	Amt	Total		
									Hrs	Rate	Amt

Remarks

Name of Foreman

Fig. 1a



BRIGHTON BEACH IMPROVEMENT

FOREMAN'S DAILY REPORT

190

EXCAVATION

Class	Total Hours	Amount
Foremen		
Labor		
Signalmen		
Engineers		
Firemen		
Tallymen		
Trucks		
Watchmen		
	Total	

Cu. Yds. Excavated by Hand

" " " " Bucket

" " " " Orange Peel

No. of Cars Loaded for Dump

" " " " Screens

Tons of Coal Used by Derrick

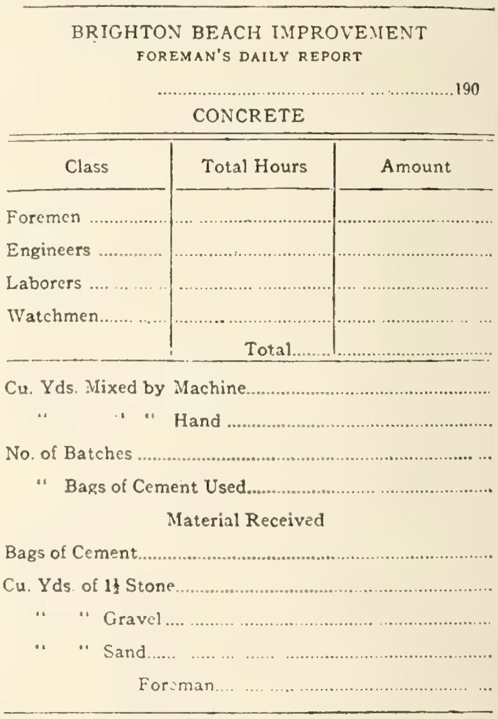
" " " Received

Foreman

Fig. 1b

Again, in considering the question of cost-keeping organization, the degree of fineness into which the work is to be subdivided becomes an important one, whether the costs are to be kept so that each morning the contractor or his engineer or manager shall be able to tell what each class of work cost him the previous day, whether weekly statements only are desired, and also whether the records must be in such shape that a stranger, without a mental picture of the work and its details, may use the records in bidding on other work after a reasonable amount of study; or whether the records are intended solely for the use of the contractor himself, his engineer or manager, who have, through constant oversight of the work, such a familiarity with the conditions that few notes are needed in explanation of the conditions under which the various classes of work were performed.

In the latter case, at any future time in looking over the records a very few memoranda will suffice to call up in the mind of the contractor who actually performed the work, a complete picture of the situation and conditions obtaining at the various stages of progress.



BRIGHTON BEACH IMPROVEMENT

FOREMAN'S DAILY REPORT

190

CONCRETE

Class	Total Hours	Amount
Foremen		
Engineers		
Laborers		
Watchmen		
	Total	

Cu. Yds. Mixed by Machine

" " " Hand

No. of Batches

" Bags of Cement Used

Material Received

Bags of Cement

Cu. Yds. of 1½ Stone

" " Gravel

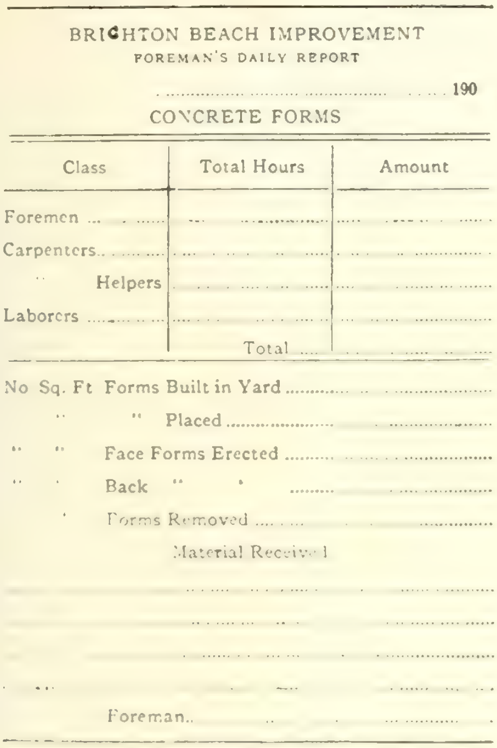
" " Sand

Foreman

Fig. 1c

It is with the latter purpose that the organization and records of Charles Cranford, with which this paper deals, were adopted.

The ordinary foreman under this system is furnished with blank reports (Fig. 1a) upon which he reports the number of each man in his gang. These numbers are written in a vertical column, and in the successive columns are written the number of hours each man works at each of the various jobs at which he may be employed during the day. The heading at the top of each column is filled in by the foreman, with the various classifications. A space for remarks on each report and the signature of the foreman com-



BRIGHTON BEACH IMPROVEMENT
FOREMAN'S DAILY REPORT
190
CONCRETE FORMS

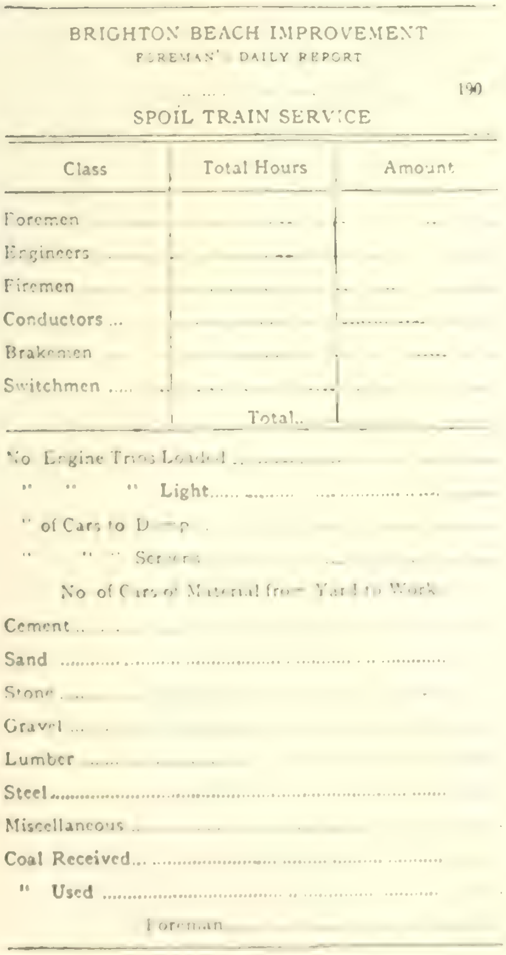
Class	Total Hours	Amount
Foremen		
Carpenters		
" Helpers		
Laborers		
	Total	

No. Sq. Ft. Forms Built in Yard
" " Placed
" " Face Forms Erected
" " Back " "
" Forms Removed

Material Received

Foreman

Fig. 1d



BRIGHTON BEACH IMPROVEMENT
FOREMAN'S DAILY REPORT
190
SPOIL TRAIN SERVICE

Class	Total Hours	Amount
Foremen		
Engineers		
Firemen		
Conductors		
Brakemen		
Switchmen		
	Total	

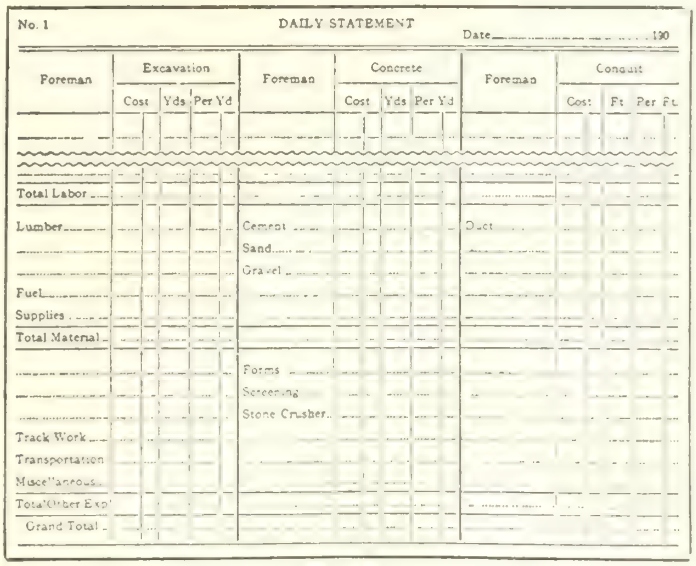
No. Engine Trips Loaded
" " " Light
" of Cars to Dump
" " " Screens

No. of Cars of Material from Yard to Work

Cement
Sand
Stone
Gravel
Lumber
Steel
Miscellaneous
Coal Received
" Used

Foreman

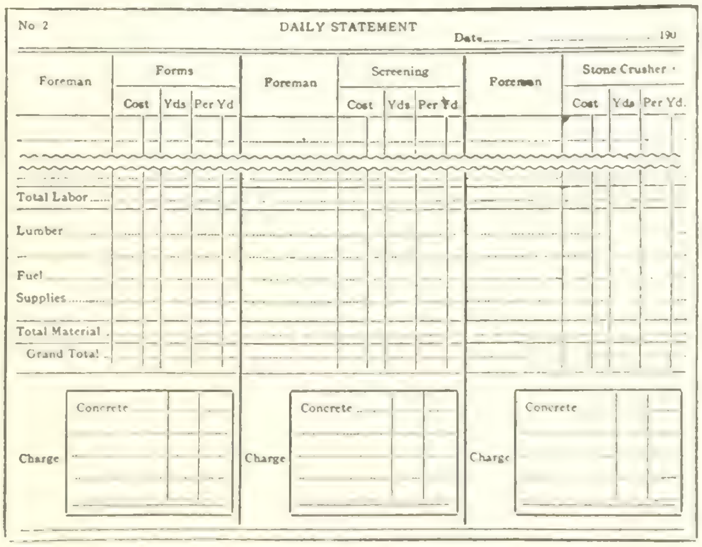
Fig. 1e



No. 1 DAILY STATEMENT Date 190

Foreman	Excavation			Foreman	Concrete			Foreman	Conduit		
	Cost	Yds	Per Yd		Cost	Yds	Per Yd		Cost	Ft	Per Ft
Total Labor											
Lumber				Cement				Duct			
				Sand							
				Gravel							
Fuel											
Supplies											
Total Material											
				Forms							
				Screening							
				Stone Crusher							
Track Work											
Transportation											
Miscellaneous											
Total Other Exp											
Grand Total											

Fig. 2a

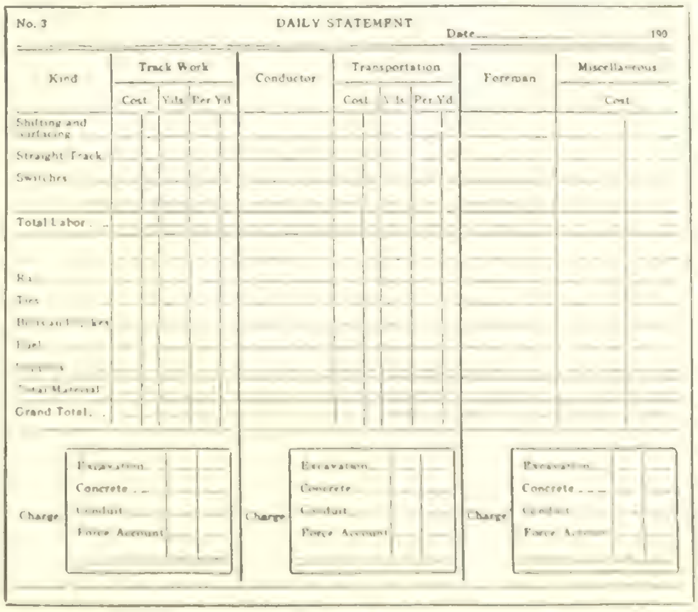


No. 2 DAILY STATEMENT Date 190

Foreman	Forms			Foreman	Screening			Foreman	Stone Crusher		
	Cost	Yds	Per Yd		Cost	Yds	Per Yd		Cost	Yds	Per Yd.
Total Labor											
Lumber											
Fuel											
Supplies											
Total Material											
Grand Total											

Charge	Concrete		Charge	Concrete		Charge	Concrete	

Fig. 2b



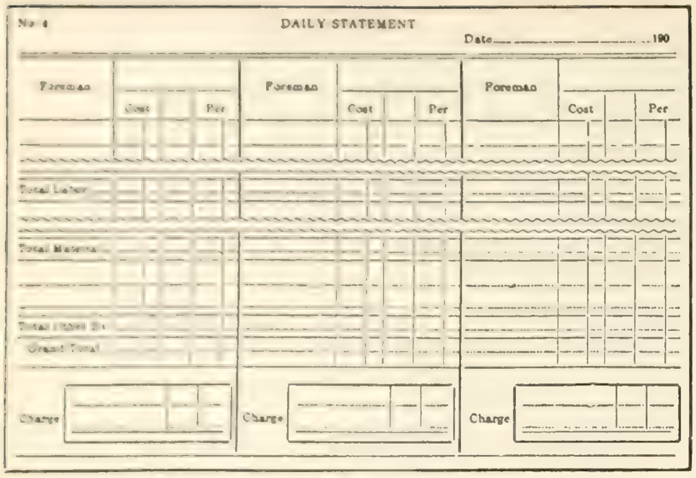
No. 3 DAILY STATEMENT Date 190

Kind	Track Work			Conductor	Transportation			Foreman	Miscellaneous
	Cost	Yds	Per Yd		Cost	Yds	Per Yd		Cost
Shifting and surfacing									
Straight Track									
Switches									
Total Labor									
Rails									
Ties									
Bolts and Spikes									
Fuel									
Supplies									
Total Material									
Grand Total									

Charge	Excavation Concrete Conduit Force Account	Charge	Excavation Concrete Conduit Force Account	Charge	Excavation Concrete Conduit Force Account

Fig. 2c

Contractors' Daily Records of Construction


No. 4

DAILY STATEMENT

Date................190

Foreman	Cost		Per	Foreman	Cost		Per	Foreman	Cost		Per
Total Labor											
Total Material											
Total [illegible]											
Grand Total											

Charge

Charge

Charge

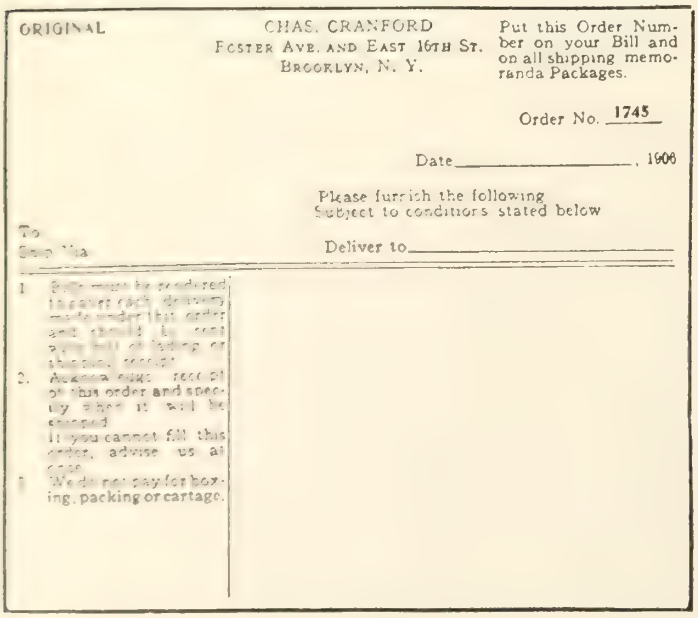
Fig. 2d

pletes this record, with, of course, the date of the report. Figs. 1b, 1c, 1d and 1e show other forms for daily reports.

The writer has never found any trouble in getting as much information upon one of these reports as is desired, even from an Italian foreman. In the case of one Italian foreman who could not write, his water boy turned in for him as complete records as could be desired, dividing the time, for example, between unloading spoil from the excavation into the receiving hopper of a screening plant, screening the gravel out of the spoil, excavating gravel from an adjacent pit, running stone crusher and loading lumber, cement, vitrified conduits and other material at the store yard, and recording the number of flat and dump cars of spoil received from the excavation, the number of narrow-gauge cars of gravel, sand, etc., from the pit, the number of flat cars of gravel loaded at the screen, the number of flat cars of sand loaded, the number of flat cars of cobble from the screen to the crusher, the number of flat cars of spoil and refuse screened from the gravel and sent to the dump, the number of flat cars of stone loaded at the crusher, and the amount of various material loaded at the store yard.

Of course, phonetic spelling is the rule and some of the effects are ludicrous, but intelligible.

These reports are first inspected by the superintendent to see if they give distribution and information desired, and agree with his knowledge. This superintendent, or the engineer, is also required to roughly cross-section each day the yardage of excavation and concrete for each foreman, and write these on the report, the foreman recording on his report the number of contractors' tubs of material excavated, or the number of flat cars or dump cars loaded with excavated material, and the concrete foreman reporting the number of batches of concrete mixed and the number of bags of cement used, while both foremen, of course, report the amount of material received, the time of unloading it and any detentions suffered.


ORIGINAL

CHAS. CRANFORD
FOSTER AVE. AND EAST 16TH ST.
BROOKLYN, N. Y.

Put this Order Number on your Bill and on all shipping memoranda Packages.

Order No. 1745

Date____________, 1906

Please furnish the following
Subject to conditions stated below

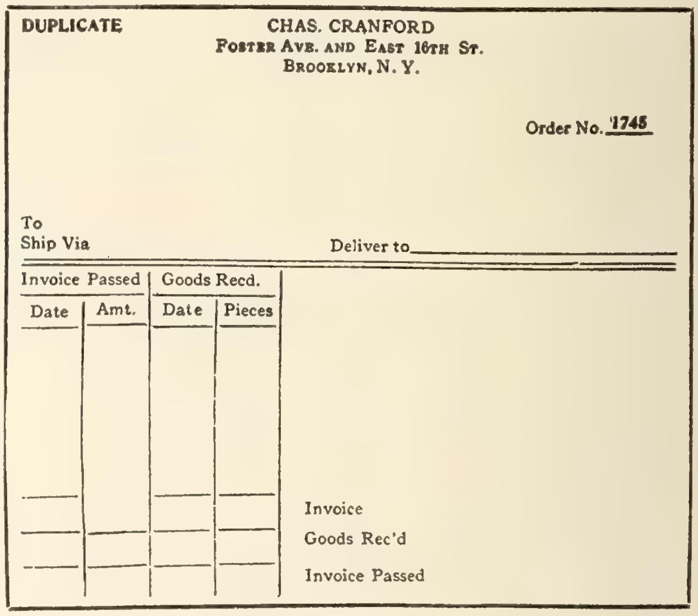
To
Ship Via

Deliver to____________

1. [illegible] delivery made under this order and should [illegible] bill of lading or shipping receipt.
2. Acknowledge receipt of this order and specify when it will be shipped.
If you cannot fill this order, advise us at once.
3. We do not pay for boxing, packing or cartage.

Fig. 3a

As soon as the foremen of the various classes of work find they are being compared as to output with the other foremen on the same class of work, they will be quick enough to report detentions, and, indeed, separate their time so as to show all the work they did which was non-productive, and to enable the time and cost of productive work, excavation of concrete, or lineal feet of sewer, or square feet of face forms and square feet of rear forms, or feet of sheeting driven and number of feet of rangers and braces placed, to be seen at a glance. It requires but a few words from the superintendent or engineer, making comparison with another gang or criticism of the lack of information on report, to make each foreman give all the information necessary.


DUPLICATE

CHAS. CRANFORD
FOSTER AVE. AND EAST 16TH ST.
BROOKLYN, N. Y.

Order No. 1745

To
Ship Via

Deliver to____________

Invoice Passed		Goods Recd.	
Date	Amt.	Date	Pieces

Invoice

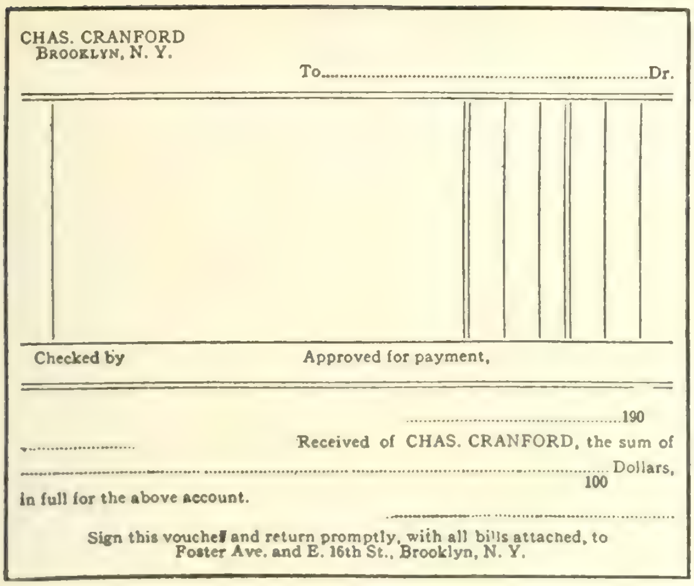
Goods Rec'd

Invoice Passed

Fig. 3b

The superintendent or engineer, having noted the various quantities on these reports, as he has measured them, and noting any force account of extra work on them, also any special or unusual distribution of time on account, they go to the storekeeper.

The storekeeper enters the cost and quantity of the various classes of work on the "Daily Statement" forms (Figs. 2a to 2d) which collect in columns under the proper headings all costs chargeable to each classification and the quantities, and shows the cost per unit for each foreman; and in addition the storekeeper writes in the amount of material and the cost of same, used for each class of work; the transportation from the conductors' reports transferred from the Daily Statement for Transportation, any rigging work from the rigger foreman's reports; under excavation, the reports of the dump foreman separated between unloading, spreading and track work.



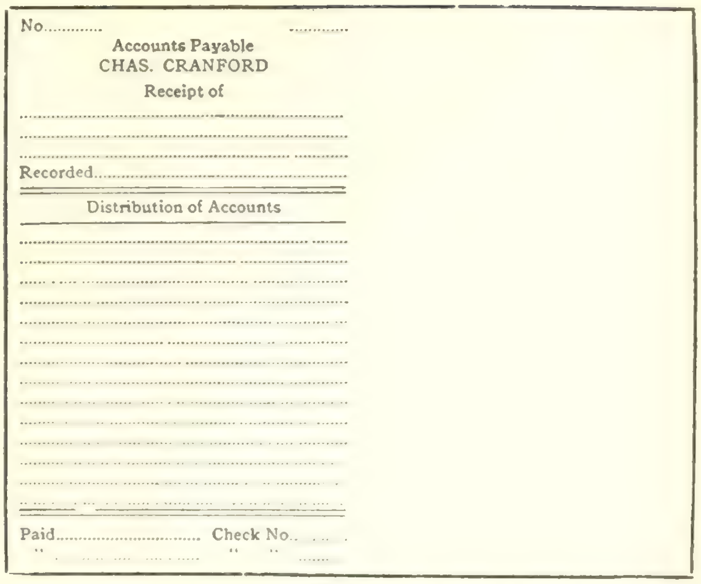
CHAS. CRANFORD
BROOKLYN, N. Y.
To..Dr.

Checked by
Approved for payment,

....190
....
Received of CHAS. CRANFORD, the sum of
....Dollars,
100
In full for the above account.
....

Sign this voucher and return promptly, with all bills attached, to
Foster Ave. and E. 16th St., Brooklyn, N. Y.

Fig. 4a



No............ ....
Accounts Payable
CHAS. CRANFORD
Receipt of
....
....
....
Recorded...
Distribution of Accounts
....
Paid.............................. Check No.........

Fig. 4b

To the concrete costs at the mixers are added the handling of material, transportation, cost of material, cost of forms (transferred from the Daily Statement for Forms) and the cost at the screen and the crusher, and any repairs from the master mechanic's report.

There is a separate daily statement for the forms, wherein the labor, material (lumber and nails) are separated, and the square feet of front and rear forms are given. The total cost, including material, is then transferred to the concrete column, and while this may increase the total unit cost per cubic yard for a day when the yardage placed is small, the total is analyzed on the statement, and on the monthly statement the average is shown correctly. This may sound like considerable work, but in practice on the Brighton Beach improvement contract, for example, where each daily statement consisted of five of these sheets clipped together, the statements were in Mr. Cranford's and the writer's hands, in duplicate, by 2 p.m. daily, at the latest, and generally before noon, and the foremen's reports were in the timekeeper's hands before that, in order to check his time-book.

These daily statements were then transferred to monthly statements (Fig. 5) classified as desired, and from these the average costs for long terms are determined.

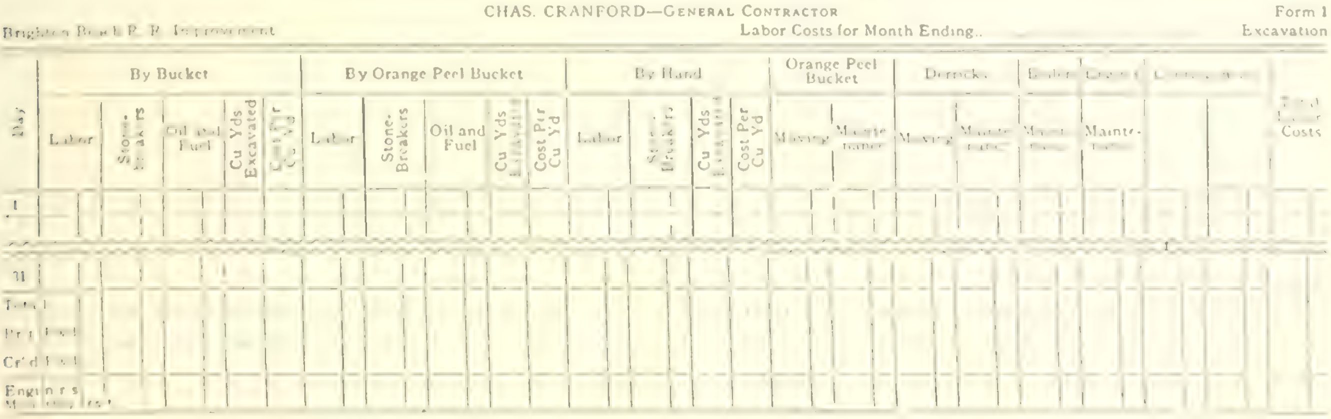
This method of cost-keeping distributes the cost of repairs daily against each class of work, the time of machinists, etc., being taken from the distribution on the master mechanic's report, material being charged by the storekeeper, as on excavating machines and appliances on concrete mixers, water supply, etc., and the material being charged by the storekeeper as sent out.

In addition to these direct costs of doing the work are the general expenses of administration, plant, etc. These need not be included in the daily statements of cost, providing that the comparison of the daily cost is made with the bid price, less profit and less general expense; but if on unit price work, the daily statements are to be compared with the bid price to see how the work is going, the distribution of general expense must be made and the proper proportion charged on the daily statement against each class of work. On the writer's work the latter method is employed.

The general expense, or administration charges may be subdivided as follows:

1. Engineering and superintendence.
2. Timekeeper and storekeeper.
3. General office force (stenographer, clerk and boy).
4. Telephone and office supplies.
5. Liability insurance, surety bond and legal expenses.
6. Rental of yards, office, etc.
7. Watchmen.
8. Interest, depreciation on general plant and miscellaneous small tools.
9. Interest and discount.

The daily general expense then should be proportioned by the engineer between the various items and



CHAS. CRANFORD—GENERAL CONTRACTOR
Form 1
Brighton Beach R. R. Improvement
Labor Costs for Month Ending..
Excavation

Day	By Bucket					By Orange Peel Bucket					By Hand				Orange Peel Bucket		Derricks		[illegible]		[illegible]			Total Labor Costs
	Labor	Stone-Breakers	Oil and Fuel	Cu Yds Excavated	Cost Per Cu Yd	Labor	Stone-Breakers	Oil and Fuel	Cu Yds Excavated	Cost Per Cu Yd	Labor	Stone-Breakers	Cu Yds Excavated	Cost Per Cu Yd	Moving	Maintenance	Moving	Maintenance	Moving	Maintenance				
1																								
31																								
Total																								
Pr. [illegible]																								
Cr'd T[illegible]																								
Engineers [illegible]																								

Fig. 5

[illegible] by the storekeeper in making up the daily [illegible].

Assume a contract that would require an engineer, superintendent, stenographer, storekeeper, bookkeeper, office boy and boy at the storeroom. If the concrete form work is of any extended amount, the salary of an assistant engineer will be well spent, to lay this out in advance, see that the lumber is used to the maximum and not wasted, measure the square feet of forms erected, and measure the quantities of excavation and concrete done by the different gangs.

With this organization, the foremen will order their material on little pads of blanks, to be O.K.'d by the superintendent, stating the purpose for which the material is to be used. The storekeeper will fill these orders from stock, and as stock decreases will make a requisition in duplicate on the engineer, giving the amount of proposed order and amount on hand, for any given item. The engineer will approve or disapprove the order, and the authorized orders should be made out in triplicate on forms of three colors for quick identification, the original to the manufacturer or dealer, the duplicate to the storekeeper, and the triplicate to be retained in the main office (Figs. 3a, 3b).

On receipt of invoice, it should be forwarded to the storekeeper to be checked against the order and returned to the main office. The voucher system of payment of all bills and payrolls should be used, where the bills are inclosed in a folded voucher, all vouchers, name of creditor, spaces for distribution of the amount, number and date of check, and name of the bank, and date voucher recorded and distributed (Figs. 4a and 4b).

The regular cash book, ledger, journal and voucher book are kept. In the voucher book each horizontal line across the double page is numbered consecutively, a line to each voucher, and the vertical columns are first the number of the voucher, next the total amount and then a column for each contract under way, in which is written the proportion of the amount of each voucher charged against that contract. This voucher book gives at once the total cost of each contract.

This system may be amplified or simplified to any desired extent, depending upon the character of the work. When it comes to using the records thus kept, in figuring on new work, the conditions under which the work was done must be carefully compared with the character of the new work.

After the cost of labor and material and delivery of the latter have been estimated, the interest and depreciation on the special plant required for each class of work and the supplies therefor must then be carefully estimated, the maximum time for completion of the work, the rental and salaries and general expenses for this period, including all of the items before enumerated under general expenses.

If the bid is to be by unit prices, these general expenses must be proportioned against the various items before bidding and then the profit added.

Most contractors now have printed books for preparation of bids on the various classes of work, on which the headings of the various items of general expenses and also the direct expenses are printed, in order to be sure that none are left out in making up the total cost. When this practice is universal, there will be fewer bids which are so disproportionately low that something has evidently been overlooked.

For such blanks and the subdivisions, nothing could be more admirable than the subdivision suggested by Mr. Gustave Kaufman in his paper read before the American Society of Engineering Contractors on January 10, 1910. Mr. Kaufman proposed ledger accounts for each class of work to take the place of the daily statements and monthly statements used by the writer as described herein.

In addition to the cost records, the writer suggests the great benefit of a pocket kodak to snap features of the work, which will be valuable in recording the conditions under which work was done, and especially of any disputed points which may require arbitration after the completion of the contract.

Accuracy in Engineering

Accuracy in engineering is greatly to be desired and in many cases is absolutely necessary for successful completion of the work. There are cases, however, where an attempt to secure accuracy leads to a refinement in results that is not warranted by the data on which the reasoning is based. An illustration of this is sometimes seen in the computation of stresses, or other functions of loads upon structures, as, for exemple, stresses in bridge trusses due to the live loads, where the results may be given to the nearest pound even though the total stress is in the hundreds of thousands of pounds, thus representing a possible error of a very small fraction of 1 per cent. The absurdity of this practice is apparent when it is considered that the loading used in computing the stresses is typical only and may vary as much as 25 per cent. from the actual loads. Furthermore, the usual specification for structural steel permits a variation in strength of about 8 per cent. either way from the mean. Another illustration is found in a recent estimate of iron ore resources in which it is stated that the total known iron ore resources in the world are 22,408,000,000 tons; this statement being accompanied by another to the effect that in 13.3 per cent. of the territory investigated the estimate of ore deposits could not be represented in figures. In this case the degree of inaccuracy in the tonnage must be large and hence the latter should be expressed in round numbers. If the data on which an estimate is made are grossly inaccurate, the figures should be omitted altogether. Let there first be reliable data, then logical methods or reasoning and finally accurate conclusions.

To color brass blue-black, make a solution of ammonia and copper carbonate in approximate proportions of 10 parts of ammonia and one part of carbonate by weight. Shake the mixture until the copper carbonate is dissolved, adding the copper carbonate to the ammonia little by little until the ammonia will not dissolve any more. Then add water equal to about one-fourth of the mixture. The pieces of brass to be colored should be polished bright either with fine, dry emery cloth or by dipping in a strong solution of caustic soda. Agitate the compound thoroughly, and on immersing the pieces of brass, keep them in motion two or three minutes. Rinse off in clean water, and dry in sawdust.

A machine designed to measure the wear caused by traffic on public highways is among the scientific instruments on show at the exhibition of the Physical Society of London at the Imperial College of Science, South Kensington.

Building Construction at Saskatoon

The Willoughby-Sumner Building at Saskatoon, which is now being erected by the Forest City Paving & Construction Company, is a four-storey reinforced concrete structure, designed for stores on the ground floor and offices on the upper floors. The building is of fireproof construction throughout, having a reinforced concrete frame, hollow tile walls and gypsum tile partitions. It covers a ground area of 130 feet by 170 feet. The architect is Mr. W. W. La Chance, of Saskatoon, and the engineering design of the building was prepared by Mr. E. W. Hyde, Jr., C. E., manager of the Saskatoon branch of the Forest City Paving & Construction Company. The building will be completed and ready for occupation next month.

A great deal of important work is being carried out in Western Canada by the Forest City Paving & Construction Company. Another one of their buildings at Saskatoon is the six-storey Willoughby Building, which is now completed and which is the tallest structure in the city. This building is of similar construction to the Willoughby-Sumner Building. The company have also carried out contracts at Saskatoon for the city filtration plant, the I. O. O. F. Temple, and several smaller jobs. They report prospects of exceptional activity this season. In addition to their Saskatoon branch they have a branch at Lethbridge, where they are carrying out paving contracts, and also at Cochrane, Ont., where they have a contract for the round houses and shops for the G. T. P. The general manager of the company is Mr. B. V. Hole, with head offices at 19 King street, London, Ont., and Mr. I. M. Hole, C. E., Saskatoon, is general superintendent. Mr. E. W. Hyde, Jr., C. E., is manager of the Saskatoon branch, Mr. S. A. Hole, superintendent at Lethbridge and Mr. Geo. Reichen, superintendent at Cochrane. The company also have an office at Calgary, Alta.

Willoughby-Sumner Building, Saskatoon, under construction

Supplying track tools is done on the Detroit, Toledo & Ironton Railway, where there is no storekeeper, under a plan wherein an emergency stock is kept on hand by the roadmaster at his headquarters and no tools are allowed to accumulate in the section houses. Requisition blanks are given to the section foremen, which are sent in at the end of the month, except in emergency cases. Tools are then furnished in accordance with these requisitions and old, worn-out or broken tools are required to be returned to headquarters. Two or three inspections of tool houses are made each year to see that this requirement is observed and to impress upon the foremen the necessity of keeping tools in good shape. Returned tools, such as picks, claw-bars and wrenches, which are good enough for repair, are sent to the shops and are then returned to the supply-house stock. A saving is thus made in the tools which would otherwise be allowed to remain in the section houses or would be loaded into the scrap car as worthless. It is also said that the delays in waiting for tools which may sometimes be badly needed are also eliminated. The greatest difficulty which is experienced is to get the foremen to send in the old tools, and this is corrected by the inspections.

The Labor Gazette suggests the following figures as representing the cost of living for a mechanic in Toronto, Winnipeg, Calgary and Vancouver: Toronto, $6.58; Winnipeg, $7.86; Calgary, $7.96; Vancouver, $8.20. These amounts are considered sufficient to cover food and average necessities per week for a workman, his wife and two children. The addition of rent and fuel, it is suggested, would bring the figures up to $12.68 for Toronto, $17.86 for Winnipeg, $18.80 for Calgary, and $19.07 for Vancouver.

Concreting in winter at temperatures not exceeding 10 deg. to 15 deg. Fah. was successfully carried on in the case of a large reinforced concrete warehouse at Delavan, Wis. The outer walls of the structure were of brick and were built up to a height a little above each floor level before the concrete was poured. The concrete plant was in the basement and the materials were heated by steam passing through a large coil of 1½-in. pipe exhausting into the water barrels at the concrete mixer. The materials were dumped directly over the steam pipe, which was laid in the form of a continuous coil. It was considered that this arrangement afforded better circulation of steam heat than the use of parallel pipes and headers. At first exhaust steam was used in the coils, but later the full boiler method gave much better results. In this way the temperature of the concrete was kept between 50 deg. and 60 deg. After the concrete was poured it was covered with canvas and salamanders were placed on the floor below, one salamander being employed to about 600 square feet of floor space.

A rather serious shortage of unskilled labor is reported from Montreal by officials of the road department, who are seeking a large number of men for the carrying out of their extensive works this summer. The city of Montreal has a particularly heavy amount of road and street work to be carried out this season, while no less than $10,000,000 has been set aside for road work throughout the province generally. In respect to the situation at Montreal the City Surveyor, Mr. Barlow, states that advertisements have been inserted repeatedly and have been almost fruitless. Mr. Barlow says that the peculiar winter accounts to a certain extent for the situation. The absence of snow till late in January drove many men, who are usually employed by the city in clearing the streets, to seek work elsewhere, and many left for the lumber and railway camps of Northern Ontario and Quebec. In addition, a great amount of building is being done in the city, and more men are employed by contractors than ever before, even comparatively unskilled men readily finding jobs. Consequently the city is unable to secure enough men to carry on as much work as has been planned.

Motion Study in Scientific Management

Division of Responsibility according to Functions Duties of Performing and Planning Departments— Economies of Motion Study

By Frank B. Gilbreth, A. Am. Soc. M.E.

THE subject of my paper is "The Place of Motion Study in Scientific Management." You undoubtedly realize that this is but a very small portion of Scientific Management, but, during the time that is allotted me for this paper, it will be impossible for me to give you anything more than a meagre description of this part of Scientific Management, with its relation to the other parts.

This I can best do by showing you graphically two plans of management. The first of these represents what is variously known as military or traditional management. As you will note here, each man is responsible to one man only above him, and is in charge of all below. Thus, it is the custom for any man to come in contact with one man above him only, the line of authority being single and direct. Traditional management has been used for centuries in military organizations, and has also been used many times in religious organizations and political organizations. The division is by men, by grades of men rather than by functions.

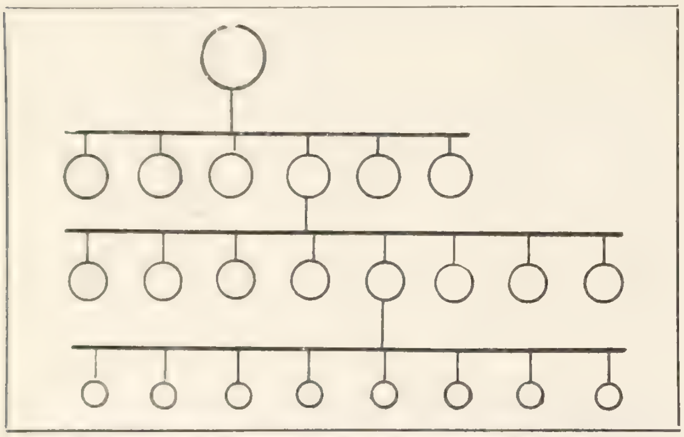


Fig. 1 —Diagram illustrating the principle of Traditional or Military Management

The second chart represents functional or scientific management, or what would be called, but for objections by Dr. Taylor, the Taylor system of management. Here the division is by functions. The first functional division is the separation of the planning from the performing. Graphically, this separation is represented by the horizontal line. All functions above this line are of the planning, all functions below this line are of the performing. Note the functions shown on this chart, namely, four functions in the planning and four functions in the performing.

This chart shows one such worker represented by the lowest circle. There could be no objection to representing each individual worker by such a circle, but the relation of each such worker to those over him is exactly the same. Hence, the lowest circle is typical.

It will be noted that the worker receives orders directly from eight different foremen. You will, perhaps, suggest, on observing this, that it has often been said that no man can serve two masters. This holds good to-day, even in Scientific Management. But under Scientific Management the worker does not "serve eight masters" nor eight functional foremen, but, on the other hand, he receives help from eight different foremen or teachers. In this way, his case is not very different from that of the student who receives instruction from eight different professors, in eight different studies.

The four functions in the planning department are represented by

(1) Route Clerk and Order of Work Clerk.
(2) Instruction Card Clerk.
(3) Time and Cost Clerk.
(4) Disciplinarian.

While I speak of each function as being represented by one person, as a matter of fact each function may include any number of individuals, according to the kind of work, and the number necessary so as to perform that function as to eliminate all possible waste. Each one of these four men of the four functions in the planning department, is supreme in his respective function. All deal directly with the worker, and all deal directly with the four functional foremen who are in the performing department.

Of the performing department we have four functions represented by

(5) Gang Boss.
(6) Speed Boss.
(7) Repair Boss.
(8) Inspector.

These functions, like those of the planning department, are represented by as many men as the nature and amount of work justifies. All such representatives deal, as the chart indicates, directly both with all individuals in the planing department and with each individual worker.

I will now explain to you, briefly, the duties of the man handling each function, and at the same time call your attention to the subject of this paper, "Motion Study," which is a very small portion of the work of function No. 2 in the planning department under the instruction card clerk and to the relation of this Motion Study to the other parts of Scientific Management, as shown in the chart.

Functions of Route Clerk

The duty of the route clerk is to plan in advance the path of each piece of material, worked and unworked, as it passes through the shop or as it is handled by each member of the organization who has anything to do with it. He is to decide the three dimensions of the path, and the route that the material is to pass through, whether it is to go to the stores or into temporary storage piles, or directly through the shop as fast as it can be moved. His function is not simply to look after the details of the moving, but broadly, to determine the entire transportation career of the material. For example, in building operations, he would determine where the

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[illegible] of Toronto Engineering Society.

car was to be placed to be unloaded, where the material was to be unloaded, when it was to be moved into the building, and exactly what path it would follow across the floor, up the elevators, and to its final resting place.

Often the route clerk is able to greatly simplify the path of the materials, especially on large orders, by a rearrangement or routing of the machinery. I have had one case in my experience where it was cheaper, in a woodworking shop, to have the machinery placed on heavy pieces not attached to the floor, each operated by an individual motor, and to move it around into as nearly a straight line as possible, in order to accommodate the peculiarities of sequence of events of each particular order, when such order was large enough to warrant moving the machinery. The route clerk's duties, also, oftentimes consist of demanding a new path, that is, ordering that machinery not used be removed, so that he can route his material by a more economical method. After he has determined the exact path by which the material shall be routed, he embodies his conclusions in route charts and route sheets; these illustrate his orders graphically, and are worked out in detail by the instruction card department.

The Inspection Card Clerk

It must not be supposed that the instruction card function consists wholly of the work of actually writing out the instruction cards. This is the name of the function in general, and this function may be handled by several men of different capacity in the instruction card function, that is to say, the department may be divided into sub-functions. It is the duty of this function to work out in detail, that is to say to devise and construct, an instruction card for each element of the route sheets and route charts. The instruction card department must furnish in the greatest detail possible, such directions as will show two different classes of men their duties, namely—

(a) The worker, who must know how to perform the particular work shown on the instruction card,

(b) The functional foreman in the performing department, who must know exactly what he is to see that the worker does perform, and exactly what he is to teach the worker in order that he may so perform his work as to conform to the instruction card and to satisfy the man who made out the card.

The Time and Cost Clerk

After the worker has performed his work, a return of the time that it took him to do his work, together with its cost, goes to the time and cost clerk, who figures out the payroll, the bonuses, and the cost of performing each task.

The Disciplinarian

He is a man who handles all matters in the entire organization pertaining to discipline. He must be a broad guage man who is able to keep peace in the organization; to anticipate and prevent many disagreements and misunderstandings before they actually occur, and to arbitrate or judge fairly such disagreements as actually take place.

Now of the functions in the performing department:

The Gang Boss

No. 5 is that of the gang boss. There may be many gang bosses in this department, in fact there are frequently five gang bosses of one trade. In such case, there would be an over gang boss in charge. There may be gang bosses in this function of twenty or thirty different trades, in fact of as many trades as are at work, or, possibly, one gang boss might look after two or more trades, or, on the other hand, there may be five gang bosses for one trade. The gang boss is not the "strong arm" type of man represented by the mate of the vessel of former days, who boasted that he could lick any man in the entire crew, and often did so for no other cause than to prove his words. He is now a man who can teach the worker the methods shown on the instruction card. His duty is to see that the worker performs the work required exactly as called for, and of the prescribed quality shown on the instruction card. In order to get his best work, and to enlist his zeal, it is usually necessary to pay him a bonus for each and every man under him who in turn earns his bonus, and a double bonus is every man in his gang earns the bonus. For example, suppose the gang boss received $3.00 per day, and had twenty men working under him, he would be paid, say, in round numbers, approximately 10 cents apiece for each man under him who received his bonus; and, if all twenty of the men received their bonus, he would receive a double bonus of 20 cents apiece for the entire gang.

You can readily see how such a plan of management as this will bring out co-operation as would no other plan, and I want to state here emphatically that there is nothing that can bring about results from Scientific Management, and the economies that it is possible to effect by it, except the hearty co-operation of the men. Without it, you have no Scientific Management.

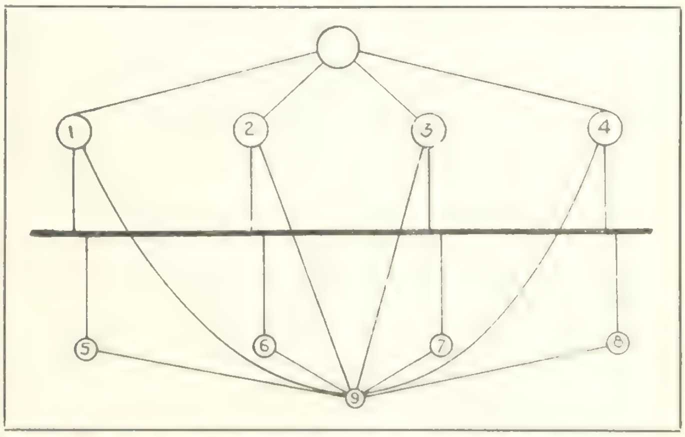


Fig. 2—Diagram illustrating the principle of Functional or Scientific Management

Speed Boss

The speed boss, No. 6, regardless of the popular impression as to his duties, does not speed up the men, in fact he has very little to do with speeding the men. His duty is to see that the machinery moves at the exact speed called for on the instruction card. You can readily see that there is some one speed that is more desirable than any other speed; for example, the speed of a buzz planer or a circular saw is very dangerous when it is too slow, while on the other hand, the speed of a fly-wheel of an engine is very dangerous when it is too fast. The one that is the most desirable and safe is the speed that the instruction card man attempts to set on the instruction card, and it is the duty of the speed boss to see that the machinery runs at all times at exactly the prescribed speed. He not only shows the worker how he can make his machine run at the speed called for, but [illegible] there be a question as to its being possible to run at this speed, he must be prepared to teach the worker by doing the work himself, or provide a man who can comply with the requirements of the instruction card.

Repair Boss

The next function is that of the repair boss. His duties consist principally of carrying out repairs and overhaulings, such as are called for on instruction cards that are given to him at regular, predetermined intervals. In this way breakdowns, as far as possible, are avoided. The repair boss, however, must be a resourceful man, prepared, in case of emergency, to jump in and repair any such breakdowns as may occur, even in the absence of precise directions or an instruction card.

Inspector

The eighth function is that of the inspector. His work is decidedly different from that of the inspector under the old type of management; for example, his inspection must result in constructive criticism, not destructive criticism. It is his duty to see that the material is rescued when it is not handled, or worked, exactly as called for on the instruction card.

Many times, under traditional management, the inspector comes around after the work is done, condemns it, and walks away, leaving it to others to see that the work is taken down, and, perhaps, carted from the premises. Under Scientific Management the inspector is required to stand near the worker when he is handling a new piece of work for the first time, in order to see that he thoroughly understands his work as it progresses. Thus the material is not spoiled. If the worker has a task of, say, fifty pieces, the inspector inspects the first piece most carefully, to make sure that he is satisfied that the worker knows exactly what he is to do, how he is to do it, and the quality prescribed by the instruction card.

The Workman

As for the individual worker, it will be seen that he receives not only an instruction card telling him what he is to do, how he is to do it, how fast he is expected to do it, the prescribed quality with which the work must be done, and how much pay over and above his usual day's wages he will surely get if he does all that is called for on his instruction card, but also, he receives personal teaching. The gang boss acts as his teacher constantly; the speed boss he can call on at all times to assist him with the speed; the repair boss co-operates with him to see that his machine is constantly kept in such repair that he can earn his bonus, and the inspector will also teach him at any time, and show him wherein he is making a deviation from the quality called for. Moreover, the functional foremen in the planning department are ready, at call, to explain their instructions. Thus he has every help that is possible, to enable him to earn the exceptionally high wages that are offered for Scientific Management. He is assured of the "square deal" from the foremen over him, and he always has the same opportunity to appeal to the disciplinarian, in case he is not being well treated, that a foreman would have in case the worker was not doing his work as well as he could do it, or was not trying to co-operate with the other workers.

Having shown the principal functions of Scientific Management and their relation to each other and to the individual worker, we are now ready to concentrate on Motion Study.

The three most oblivious economies to be obtained by Motion Study would be to use (1) the fewest motions, (2) the shortest motions, and (3) the least fatiguing motions; but these, however, are but a small part of the list of savings that could be obtained.

For example, in one organization with which I have recently been working, I found a man who had been working in the same shop for over twenty years whose duties consisted of doing work that required his hands to be within six inches of the floor on which he stood, practically all day, except when he was resting. This man was one of the tallest men that I ever saw, he surely was more than 6 feet 6 ins. On the other hand, I found in the storage department one of the shortest men I ever saw, who was piling cases up in a pile about 7 feet high. Now it must readily be seen that there are other things to be considered, as for example, the best adapted motions for the work.

Motion Study is a part of the function No. 2 of the planning department. It is here necessary to go back a little way and see what it is that the instruction card man is supposed to do. His duty first of all is to devise a way that is most economical and the least wasteful of any way that can be divised, and the nearer that he can get to perfection the better he is in his function. The nearer he devises a method that is fundamentally right the more scientifically can rates be set. It must be remembered that under Scientific Management the rate is never cut. Any manager who is familiar with the evil by-products of cutting the rate on piece work will readily understand the tremendous benefits that accrue from any system where the rates are so fixed that not only the rate need never be cut, but that there is no incentive to ever cut the rate. Cutting the rate results in scientific loafing, which is quite the opposite of hearty co-operation, and, as I have said before, without hearty co-operation you cannot have the great savings that make it possible to pay the unusually high wages to the workmen, and at the same time provide the unusually low production costs to the employer.

Motion Study is so intimately related to time study that it is quite difficult to specify exactly where one begins and the other leaves off. Perhaps the best way to describe it would be to say that Motion Study is for the purpose of determining how long each element of the process will take, and how much time must be devoted to rest for overcoming fatigue.

Motion study theoretically is supposed to furnish measurable units for time study, but the units are so small that they have not, until recently, been timeable.

I expect to place a mechanical device on the market within the next two months that will accurately time the motions of the workmen down to the thousandth of a minute without any of the inaccuracy that comes from the human element in the observing. For twenty-five years I have been advocating the method of teaching right motions first instead of teaching quality of output first. You undoubtedly will realize that it takes considerable courage (or else positive proof) to advocate openly neglecting all thought of the quality temporarily for the sake of great precision of right motions.

Only a short time ago I told two prominent members of the A.S.M.E. that I had had unusual success with teaching boys and men new methods by using great care in having them use the right motions first and then the right motions with increasing speed until the maximum speed was reached and to give no thought whatever, meantime, to the quality. The answer of these two gentlemen was—that if that was the way that I did my work I couldn't expect to ever do any work with them.

Now it is quite difficult, if not actually impossible, to make some people realize that great precision of motions is identical to giving great attention to quality of output, for if the motions have sufficient precision the quality will undoubtedly have also the greatest precision that would be obtainable by that particular workman. I think that one reason that the great benefits that can be derived from emphasizing teaching the right motions first, was not recognized, was because the teachers of the trades did not know what the right motions are. Ordinary photographs, stereoscopic photographs and motion picture photographs now enable us to recognize and determine, separate and measure the various motions with great accuracy, and the results are quicker teaching, automaticity of motions, habits of right motions and less fatigue and less percentages of fatigue. These all permit much faster motions.

There are a great many other reasons why motions should be standardized, and if they are standardized, it goes without saying that the motions should be the right motions. One of the reasons for taking great care in standardizing motions is that it reduces enormously the amount of time study that must be taken, and time study is at best an expensive and somewhat tedious process. It is much more necessary that we have a standard method for each process early, than that we wait until we devise the best possible methods; however, it is, of course, desirable that the standard process shall be built up from the best known motions at the time that it is standardized.

Now there are a great many variables that affect the motions, and I give here variables as cited in the first edition of Motion Study. This is by no means a complete list as there are as many more variables recognized to-day, but this list will give you a fair idea of what we mean by the "variables that affect the motions," and oftentimes it will be found that the variables make necessary or advisable the complete elimination of certain motions that were considered necessary before due consideration was given to the variables. These variables may be preferably divided into three kinds: (1) the variables of the worker; (2) the variables of the tools, equipment, appliances; and (3) the variables of the motion itself.

Variables of the Worker

Anatomy, brawn, contentment, creed, earning power, experience, fatigue, habits, health, mode of living, nutrition, size, skill, temperament, training.

Variables of the Motion

Acceleration, automaticity, combination with other motions and sequence, cost, direction, effectiveness, foot-pounds of work accomplished, length, necessity, path, play for position, speed.

Variables of the Surrounding Equipment and Tools

Appliances, clothes, colors, entertainment, music, reading, heating, cooling, ventilation, lighting, quality of material, reward and punishment, size of unit moved, special fatigue-eliminating devices, surroundings, tools, union rules, weight of unit moved.

The scheme of Motion Study is to discover perfection and to perpetuate it automatically.

Scientific Management has been extremely slow in making an advance in the industries and the principal reason for this is that the scientific managers have been obliged to train their own men. There is no school at the present time that has sent out young men who were even familiar with the vocabulary of Scientific Management, so far as I and my associates have been able to determine.

After having determined the right motions, the right times for the motions, and having grouped them into cycles of elements, of subdivisions, of processes, we then determine the amount of rest that must be allowed for overcoming fatigue, and then we have the standard task for the standard man, and here I must tell you about the difference between the "standard man," the "first-class man" and the "given man." The motions and the time are taken on the standard man; that is, the best man procurable, the best man that we can get to be observed.

While motions and the time of motions have been determined by observing the best men procurable, it is not to be expected that other men will be obtained who will be as good as the best man picked out for this purpose. The first-class man is the man who is best adapted to this particular work; that is to say, the best man adapted to do this work continually and thrive. The first-class men are obtained from the given men. Some find that they cannot do the work, and either become discouraged or assigned to other work before they get discouraged. Many people think that the hard task makes an unwarrantable hardship upon the worker, but this is not so, for Scientific Management contemplates having each man work at the highest class of work for which he is mentally and physically and by experience able to work at continuously and thrive. The interdependence of all the men from the individual workman to the highest man in the planning department is so noticeable that it is necessary that those men only are picked out to do the work who are capable of doing it so as not to delay those that follow him in a dependent sequence of operation. If an inefficient man who could not be depended upon to do a certain predetermined piece of work were permitted to work at a place where he failed to perform his task day after day, he would interfere with all those men who followed him earning unusually high wages; therefore it would not be fair to the other men to permit any man to work at any job that he was not fitted to do continuously to the quantity called for in the task.

Now that there is so much literature on the subject of Scientific Management why is it a fact that the progress of Scientific Management has been so remarkably slow? The answer to that question is that many people who are thoroughly familiar with the duties of the men and the various functions are not familiar with the pitfalls that are ever present in its installation. As I have said twice before, the entire scheme is dependent upon the hearty co-operation of everybody in the organization, and workmen everywhere have been deceived so many times in the past that they are naturally suspicious that this Scientific Management is nothing more nor less than a new edition of the confidence game presented to them in a more deceptive form than they have ever seen, and they believe that it is for their best interests to smother while it is still young.

On the other hand, there never has been a case where Scientific Management has been put in properly that all the workmen did not realize that it was much better for them than any form of management that they had ever seen. To those of you who are interested in Scientific Management I respectfully suggest that it would pay you to go to Philadelphia and to see the Taylor Manufacturing Co. and the Link Belt Co., who have had the Taylor System longer than any other concern in the country.

Now that there has been many successful demonstrations of Scientific Management where the workers receive much higher wages than ever before and where the costs of production are lower than ever experienced by manufacturers before, it seems extremely unfortunate that the terrible wastes that are going on where Scientific Management is not in operation, should continue, and I therefore hope that this university will consider seriously the study of Scientific Management not only for the education of the young men who are going out in the world as engineers, but also with the idea of establishing a permanent station for the collection of Motion Study and time study data working in co-operation with similar colleges in the United States and Canada and also with various organizations who are doing good work toward investigating and disseminating information regarding Scientific Management, particularly the Society to Promote the Science of Management.

The problem is too great for any one firm, corporation, or college; in fact, this is work in which English speaking nations should unite the same as we have already done in our investigations of matters pertaining to medicine, agriculture, and the animal industries.

I hope to see an international bureau for the study, for the collection, study cataloguing and dissemination of data relating to Scientific Management that the workmen of all countries may be benefited and that unnecessary wastes may be eliminated.

Methods of Patching and Repairing Concrete

AN investigation of current practice in patching and repairing plain and reinforced concrete to determine the most satisfactory methods has been made during the past year by the committee on masonry of the American Railway Engineering Association, and the results are summarized in its report. Several methods reported to be in use are described by the committee and comment on their usefulness is made in the light of replies to the circulars sent out. The committee then draws general conclusions as to methods of doing this kind of work.

Wet Method.—The surface of the old concrete is thoroughly roughened, cleaned and drenched with water and covered with a cement grout. Then the new concrete is mixed to a sloppy consistency and applied, being held in place until set by forms. It appears that many successes and many failures have followed this method. Where it has been successful, it is believed that the result probably has been due to painstaking care and expense being employed in the preliminary cleaning and thorough wetting of the old concrete surfaces before the new concrete is applied.

Moderately Dry Method.—The surface of the old concrete is thoroughly roughened, cleaned and drenched with water and powdered with cement or painted with cement grout, after which the new concrete is applied and thoroughly tamped against the old surface. Generally, such patches are kept moist by sprinkling with water for several days. The same comment is made on this method as on the wet method.

Dowel Method.—This is a modification of the two preceding and is generally used for other than horizontal surfaces, although it may be applied to the latter. The new concrete may have any consistency to meet the particular conditions or the ideas of the engineer, but usually a fairly wet concrete is used. The method includes drilling holes and setting dowels into the old concrete, with projecting ends to engage the new concrete. Sometimes steel bars or metal fabric are connected to the dowels to insure permanency of the patch. The committee observes that this method can be made uniformly successful, but cannot always be applied. Where any considerable mass of new concrete is to be connected to old concrete it is believed to be the only safe method.

Wedge Method.—This includes the cutting out of defective concrete in such a manner as to undercut the surrounding good concrete, so that the new concrete will be held in place by the shape of the binding edges. The difficulty of undercutting concrete so as to secure such edges is pointed out to be too great to make this method applicable in ordinary cases, and, except where a considerable depth of new concrete is to be put in, such undercutting could not be successfully done.

Cleaning with Steam.—The surface of the old concrete is brushed as clean as possible with stiff brushes and then gone over at least twice with a steam jet. A piece of ½-in. gas pipe is stated to make a satisfactory nozzle. This pipe is connected to a steam hose so that it can be readily moved about. The steam is supplied by the boilers of the mixer or hoisting engines. The steam will clean and heat the concrete surface, leaving it perfectly dry, so it is important to drench the surface thoroughly with water after cleaning with steam. In cold weather it is found advantageous to use hot water. Immediately after the surface is cleaned and drenched the new concrete is applied. Excellent results have followed the use of this method, but it is essential that the surface of the old concrete be drenched with water after using the steam jet.

Cleaning with Acid.—This includes washing the old concrete with a solution of hydrochloric acid, one part acid to two parts water, after which the surface must be carefully washed to remove free acid. This is very commonly applied in cleaning old concrete preparatory to placing new concrete against it, and is considered by many the only safe one to use, especially where a finish coat is to be put on.

From a study of the material collected, the committee has prepared conclusions which are in substance as follows:

In all cases the surface to be repaired must be thoroughly cleaned of all loose material, laitance and dust and the clean, rough, sound concrete exposed to receive the patch. Probably the best method of cleaning is by means of a steam jet. The surface to be repaired must then be so thoroughly drenched that the old concrete will not absorb water from the new mortar or concrete used in patching. If possible, the surface should be kept covered with water for several hours.

If the repair is to be made on a vertical or sloping surface and is not to be more than 1½ inches thick, the surface of the old concrete should be spattered with a cement grout, while it is still wet, following this immediately with a fairly stiff plaster coat of mortar made of the same proportions of cement and sand as used in the original concrete, but never richer than 1:2½. This coat should not be thicker than one-half inch and each coat should be forced into the surface, but not dragged with a trowel. The surface of each coat, except the final, should be scratched to give a bond for the next. This plastering should preferably begin at the top and progress downward, and only enough time be allowed to permit each coat to receive its initial set before the next is applied. The final coat should be finished with a wooden float and only enough water used to finish the surface properly. The patch should be kept damp and protected from sun or frost till fully set.

If the repair or finish coat is to be made on a horizontal or nearly horizontal surface, the old concrete should be slushed and broomed with a thin grout, following this immediately with a wet 1:2½ mortar, using sand or granite screenings, and of the full thickness required, but not less than one-half inch. When the mortar begins to take its initial set, it should be floated or trowelled to a finish.

If the repair is to be made on a vertical or sloping face and is to be more than 1½ in. thick, it is advisable to embed dowels into the old concrete, as deeply as the thickness of the proposed patch and spread sufficiently close to anchor the patch firmly to the old concrete. The dowels must be wedged into the old concrete and it is advisable to fasten wires, metal fabric or bars to them, in the case of extensive patching, as a safeguard. The patching may then be done with mortar without forms, or with wet concrete supported by forms, depending upon the thickness and the extent of the patch.

If the repair is to be made on a horizontal or nearly horizontal face and is of considerable thickness, dowels may be used, or the concrete may be reinforced by fabric or bars without using dowels, treating the patch as a block of masonry.

Care must be taken not to have thin edges on patches. To avoid this, it may be necessary to cut out sound concrete around a place to be patched, so as to give deep edges to the patch. If possible, the edges should be undercut.

Reinforced Concrete Tanks for Railroad Service

CONSIDERATIONS influencing the use of reinforced concrete in the construction of water tanks for railroad service are reviewed by the committee on water service of the American Engineering Association in its report to the 1912 convention and the opinion is expressed that in permanent reconstruction work this type of tank should receive favorable attention.

The advantages of the concrete water tank are stated to be low maintenance cost and durability. Possible disadvantages are discussed in detail with a view to bring out the best means of meeting and counteracting them. The fact that these tanks are an innovation in railroad service is recognized as operating against them until they have developed sufficient merit to overcome that influence. Incidentally it is pointed out that local imperfections in materials and workmanship must be overcome to secure a uniform, high-grade monolithic construction.

Difficulties to be Met

High first cost is named as a disadvantage which may be justified by the advantages named. It is stated that in some cases a reinforced concrete tank costs less than a steel one of like capacity, but that the reason is that the design is probably sparing of materials. A thin shell and a high stress in the steel in such cases are pointed out as liable to result in a leaky tank. When the stress is low enough and the shell thick enough to insure against leakage, it is believed that the cost of a reinforced concrete tank is greater than that of a steel one.

Porosity is considered to be a surmountable difficulty though a common one. It is believed that a concrete impervious under the pressures required for railroad water service may be obtained by careful selection and grading of materials, liberal use of cement, complete and uniform mixing and proper placing.

Shrinkage is looked upon as inevitable and likely to be increased by the large amount of cement used in water-tank construction. Cracks result, especially along joints between courses. Serious cracks are believed to be preventable by careful making of joints and judicious reinforcement, and a vertical dam of non-corrosive metal inserted in the lower concrete in making the joint is stated to be desirable.

Stretching of the Concrete

Another serious difficulty pointed out is the stretching of the concrete under the water load, which is likely to produce fine cracks. The report observes that no matter how dense and impervious the concrete in its unstrained condition, it may be stretched beyond its breaking strength and fine cracks, through which water will flow under pressure, may be opened by stressing the steel within its elastic limit. If the tank could be maintained constantly full of water the moderate leakage due to such stretch would generally stop through deposits of suspended matter from the filtering water. In some cases this would be assisted by chemical precipitation. But under general service conditions, there is a wide fluctuation of pressure, and the elastic recovery of the steel as the pressure drops appears to break down this plugging action where the steel is stretched materially beyond the breaking point of the concrete.

The effectual remedy for stretching is believed to be the combination of low stress in the steel with increased thickness of the shell so as to prevent the opening of cracks which will permit the filtration of water. That increases the cost of the steel to a point which approaches the cost of steel in the tank.

The committee is of the opinion that the ultimate stress of the steel without assistance from the tensile strength of the concrete should not exceed 10,000 lb. per square inch, and that the minimum thickness in inches of the concrete at any point should be such that when the total tensile stress due to the water load at that point is diminished by 3,000 times the sectional area in square inches of the steel at that point, the remaining water load will stress the concrete at that point 300 lb. per square inch provided that in no case shall the thickness of concrete be less than 4 inches. The committee does not say that concrete will not break under a tensile stress of 300 lb. per square inch, although experiments indicate that concrete of the high grade required for tank construction may have an ultimate tensile strength of 400 to 500 lb. per square inch.

The specifications as to thickness of concrete is an arbitrary one intended to secure a minimum and reasonable thickness somewhat in excess of the thickness of concrete in tanks already constructed in which the stress in the steel has been 12,000 lb. or more per sq. inch, resulting in some leakage. The primary object is to secure a minimum thickness of wall in which any tension cracks will be localized and minute and through which it would be difficult for water to pass. The size and arrangement of reinforcing rods are believed to have an important bearing on the minimum permissible thickness of concrete. The shrinkage of the concrete around large rods in a thin wall is considered liable to crack the concrete.

In connection with trouble from stretching, the committee considers it feasible to design a shell which shall be in compression. Such a shell would consist of a series of short, flat, abutting arches, convex to the centre of the tank, with the reinforcing steel supported by exterior pilasters forming the abutments of the arches. The radius of the arches would be proportioned to make the total compression in the concrete equal to the total tension in the steel and the rods between pilasters would be covered with metal lath and plaster. It is believed that the density and imperviousness would be increased by the water load and that the panelled polygonal faces would improve the appearance.

Waterproofing the Tank

Satisfactory waterproofing is considered to be a difficulty, since the trouble with openings is aggravated by the shrinking and stretching. It is stated, however, that tanks in service prove that it is practicable to make concrete impervious under the pressures ordinarily existing, by proper selection, grading and mixing of materials. Soap and alum incorporated with the concrete or applied as washes are mentioned as effective in this service also.

The dangerous effects of frost on saturated concrete is believed to be eliminated with satisfactory waterproofing. This is because waterproof concrete is very dense and the small quantity of water getting through is unable to damage concrete of that character. Ugliness, which is recognized as an objection, is also largely eliminated when leaks and efflorescence are avoided.

Inability to move concrete tanks is presented as one of their limitations, inasmuch as it confines their use to places where there is no probability of a change of location for the purpose of obtaining a better water supply or other reasons.

Cement lumber is a new form, devised by a United States inventor, of making use of cement which dispenses with the necessity and uncertainty of mixing the material. The lumber consists of slabs made in suitable lengths, and this material takes the place of wood on the outside of a house. The framework is erected in the ordinary manner and a metal tie is nailed on the studding. The latter is galvanized and has a slotted edge. The ends of the slab come up to this and are held in place by bending the edge of the ties, first to one side and then the other, over the ends of the slabs. Subsequently the whole surface is finished by a coating of cement which fills all the crevices and covers the exposed portions of the tie. The metal tie costs two cents a foot. A cement house put together with a screwdriver is yet another novelty which has been recently introduced in the United States. The system is designed for houses of a more or less temporary character, or for houses that are liable to be moved from point to point, such as a temporary workshop or a private garage. The system consists of blocks of concrete in which has been burned a wire spiral with an opening in the cement to take a small bolt. These slabs are bolted in position over a metal or wooden frame, and when it is desired to move the structure the bolts may be readily removed with a screwdriver, and the whole structure transported without any damage to any desired point.

Is Electricity Dangerous to Concrete?

IN the Proceedings of the American Institute of Electrical Engineers for November, Messrs. Harry Barker and W. L. Upson draw a number of conclusions from experiments carried out under their general supervision at the University of Vermont, to ascertain the nature of electrolytic disruption of reinforced concrete. These conclusions, which are stated to be merely tentative, are as follows:

The disruption of reinforced concrete may result from stresses produced by local thermal expansion where the current density is high, with either alternating or direct current, and irrespective of the direction of the current in the latter case.

With small current densities and without temperature stresses being developed, disruption finally results from the accumulation of iron oxide at and near the imbedded iron where direct current leaves the iron to enter the concrete.

The bursting stresses developed with low current densities are largely caused by the formation of iron oxide, immediately at the anodic surfaces to a slight extent, but largely in the concrete near the anodes, the depth of penetration depending on the porosity of the concrete, the gas pressure, current strength, etc., among other things.

No gradual reduction of the strength of the concrete has been shown to accompany progressive corrosion of the iron. The oxygen for the formation of oxide, probably, is furnished mostly by the electrolysis of water, and only to a slight degree is taken from the cement compounds.

Disruption may result with low current densities where iron is not the anode material, if other compounds are formed from the anode or from the concrete and expand during the secondary reactions. In all cases, pressure of gases developed may slightly assist or hasten disruption.

The general softening of the concrete after rupture is similar to that in specimens crushed mechanically, and may be here regarded as largely the result of the bursting stresses.

A single current of small density may cause corrosion and disruption at several points by passing to and leaving a number of pieces of reinforcing steel, each completely imbedded.

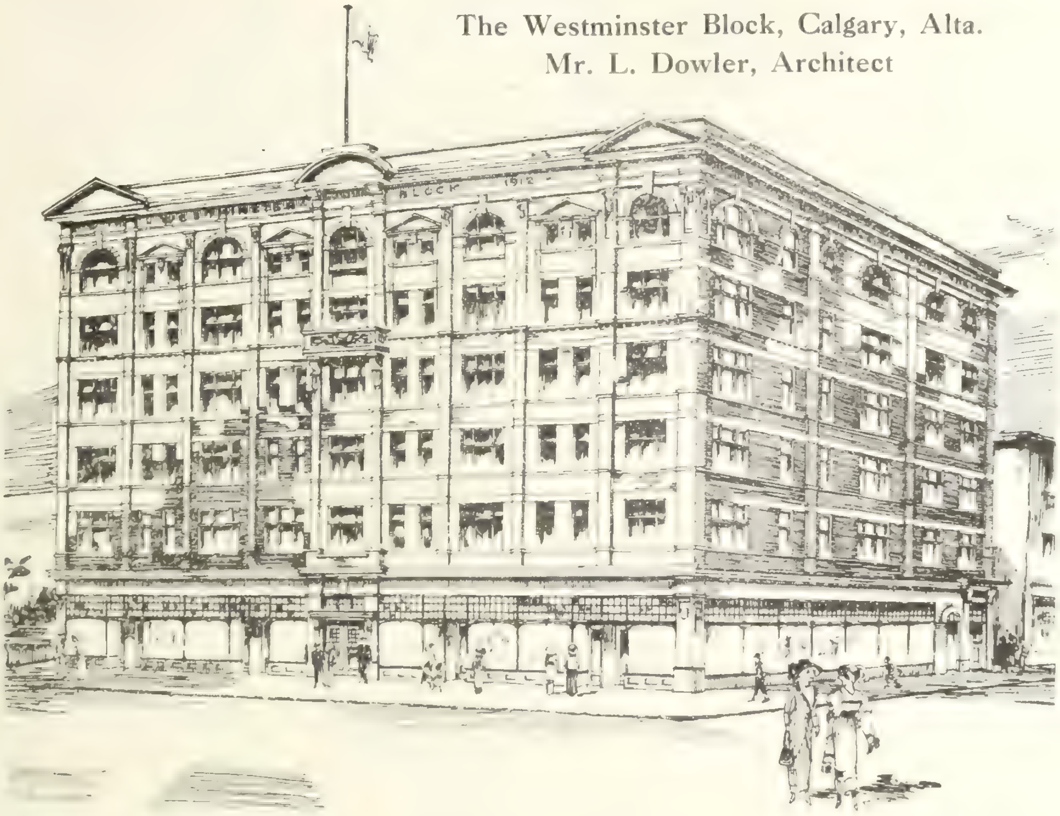
With large leakages of either direct or alternating current to reinforced concrete, structural failures may be expected within a few hours of the start of current and as the result of thermal effects.

With small leakages of direct current, an insidious undermining of structural strength must be expected.

With alternating currents, when the current density is low enough to eliminate local temperature stresses, repeated tests have shown no danger or structural troubles. This is in accord with the findings reported by Mr. J. L. R. Hayden before the A. I. E. E., March, 1907, but does not mean that there is absolutely no effect from alternating currents. It would indicate, rather, that the secondary reactions were so slow that the primary reactions were practically reversed at each cycle.

Structural trouble is not to be expected with dry concrete unless random high direct-current voltages are noted on the structural members.

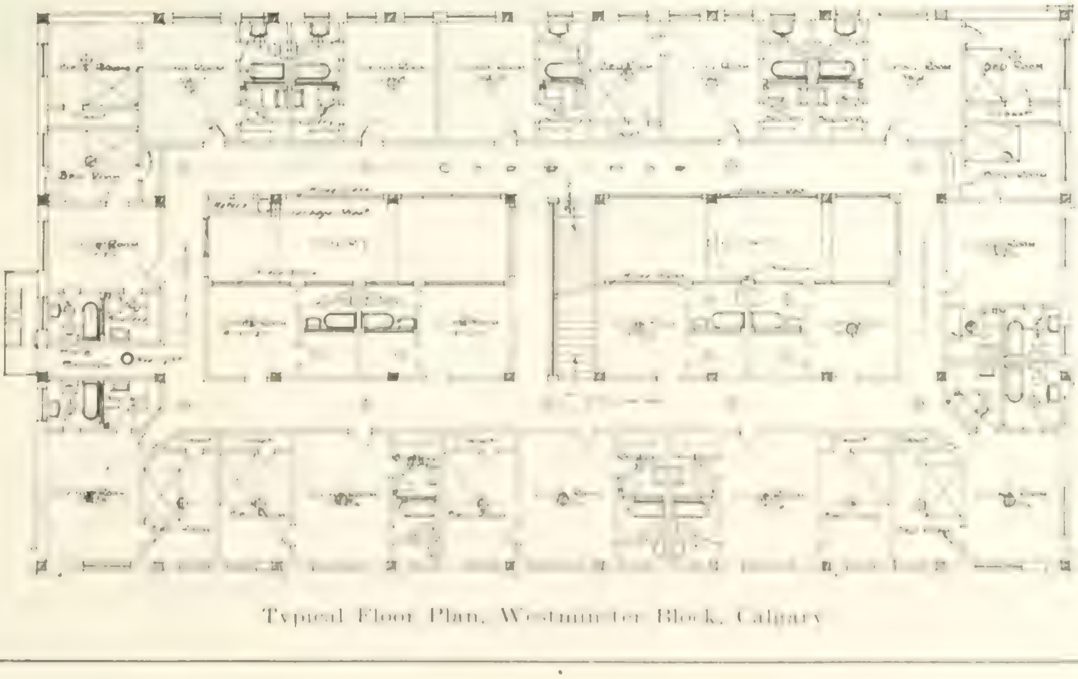
Present methods of electrical survey seem sufficient to detect dangerous (to the structure) voltages about reinforced concrete structures, and remedies are available for application as each individual case under consideration seems to demand.



The Westminster Block, Calgary, Alta.
Mr. L. Dowler, Architect

The Westminster Apartment Block, Calgary, Alta.

By the courtesy of the architect, Mr. Leo Dowler, of Calgary, Alta., we are enabled to reproduce herewith a perspective and typical floor plan of the new Westminster Block at the corner of Tenth ave. and First street east, Calgary. The building is of steel skeleton construction with brick curtain walls and concrete floors reinforced with expanded metal. The ground floor is laid out for stores and the upper floors are designed as an apartment building. Each suite of rooms consists of one bedroom, living room, bathroom and kitchen. It was the original intention to provide for six storeys, but to complete only three at the present time. It is probable, however, that the construction of the six-storey building, as shown in the perspective, will be carried out during the present operations.



Typical Floor Plan, Westminster Block, Calgary

Proposed Harbor Works at St. John, N.B.

Details of Great Undertaking which will Involve the Expenditure of Millions and Afford one of the World's Finest Harbors

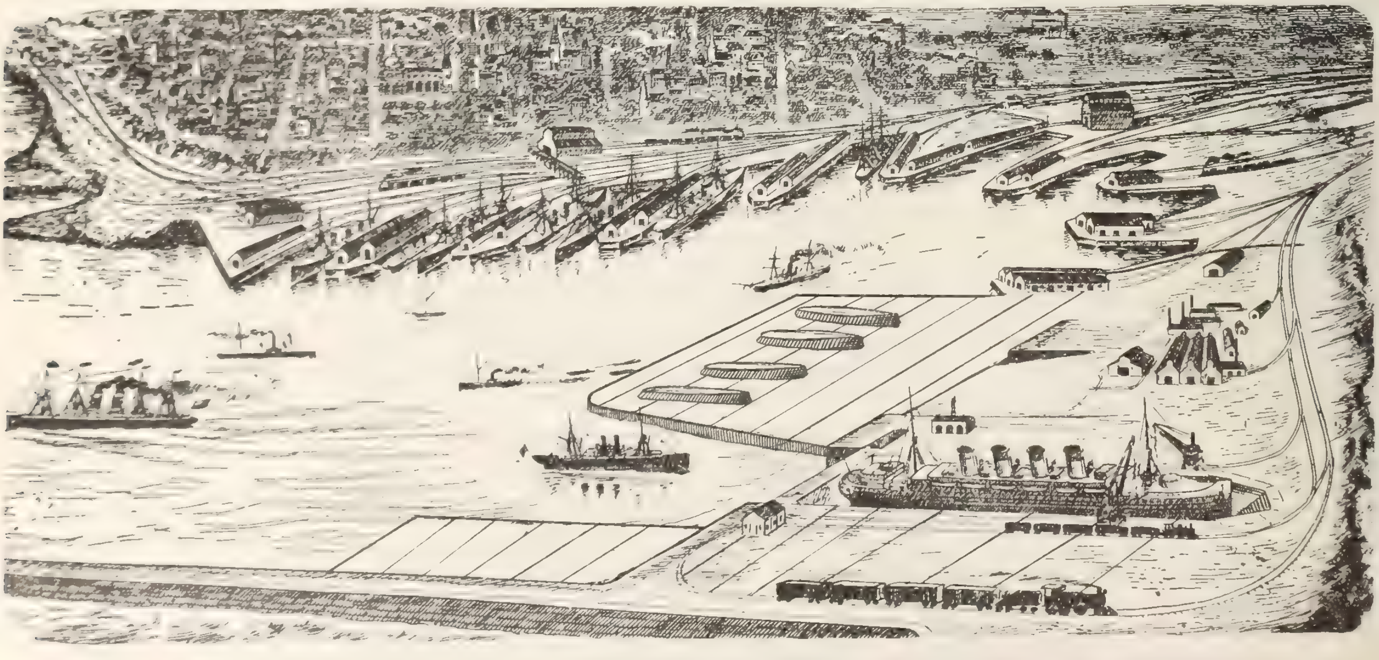
THE contract for the development at Courtenay Bay in the Harbor of St. John, N.B., awarded by the Dominion Government to the firm of Messrs. Norton Griffiths & Company, Limited (Canada), has been signed at Ottawa. The contract price of the contemplated facilities is $7,500,000 and the work is to be completed in five years. In addition the agreement with the contractors includes the construction of a first class dry dock, under the Dry Dock Subsidies Act, 1910, on which a capital expenditure of $4,000,000 is to be made. Mr. W. Burton Stewart, managing director of the Norton Griffiths Company, states that the work at St. John will be started almost immediately. The full development of the facilities for which Courtenay Bay occupies such an ideal site, will constitute, when completed, one of the most modern harbors in the world.

The complete scheme, as laid out, encloses an area of approximately 400 acres by means of a breakwater 4,570 feet in length. The area of the harbor is to be dredged to a depth of 32 feet below low water and is to be increased later on to 36 feet. The entrance channel, which is 6,800 feet in length, and 500 feet wide, will also be dredged to a similar depth. The dredging plant, composed of suction and bucket type dredgers, will be the largest and most modern ever put in on the American continent. It will be capable of dredging to a depth of 65 feet.

A large area will be reclaimed for railway terminals, and wharves on the city side of the bay, adjoining the tracks of the I. C. R. and according to the complete plan some 22 berths will be provided, for vessels from 700 to 1000 feet in length. The present contract includes about 4734 feet of wharves. The main entrance to the harbor between this reclaimed land and the end of the breakwater will be about 1,600 feet. The dry dock will be built on the northeastern side of the bay but the exact location has not yet been definitely fixed. This dock will be 900 feet in length, 110 feet in width and 35 feet depth of water on sill at high water. The reclamation will be made of sufficient size to allow for a shipyard and repair shops. The plans of these repairing shops show that the plant is to be erected on a large scale, up to date, and equipped with the most powerful of modern machinery, so that the largest ships, such as those which ply between the Old Country and New York, can be handled with ease.

The carrying out of the work will be proceeded with as follows: During the first year a large quantity of rock will be required for forming the breakwater and rubble slopes around the land to be reclaimed for the site which is to be used for the ship repair yard which will adjoin the dry dock. The surface of this reclaimed land will be raised to 10 feet above high water. The slopes of the breakwater will be 1 to 1 on the harbor side and 2 to 1 on the seaward side. The top level of the breakwater will be 12 feet above high water and will be 20 feet wide.

During the second year the dredging of a temporary channel leading to the site of the quay walls near the I. C. R. tracks head of breakwater and also to the site of the dry dock, will be done. The material raised by the suction dredger will be pumped by pipe line on to the site of the ship repair yard. The dredging for the quay walls will be carried down to a level of 39 feet below low water, and rubble will be deposited 5 feet deep for the foundation of the cribwork. The cribs, which are to be made of birch timber, will be 48 feet wide on the base, 43½ feet high and 120 feet long. They will be built in a convenient part of the foreshore near-by, floated into



General View of Proposed Harbor Works and Ship Repairing Yard, Courtenay Bay, St. John, N. B.

position and sunk. The face timbers of the cribs will be 2 feet thick and the base or platform of the crib will be 1 foot thick. The upper portion of the cribs is finished off with a timber platform 10 inches thick, on which is constructed a wall or concrete superstructure 26½ feet high and 18 feet wide on base.

The filling behind the cribs and portion of land adjoining quay walls will be reclaimed by depositing the dredgings from the basin. 4734 lin. ft. of quay wall will be constructed in this way, giving 32 feet at low water for vessels lying alongside and berths from 700 to 1000 feet long. 1800 feet of the breakwater will be formed of cribwork and carried out at the same time as the similar work for the quay walls. The superstructure will be of plain and reinforced concrete. The shore end of breakwater for a length of 2770 feet will be constructed entirely of rubble.

With the protection of the breakwater now completed the dredging of the entrance channel and basin will be carried on with the most modern and up-to-date types of suction and bucket dredgers until a depth of 32 feet below low water has been obtained, the dredged material being used in the reclamation work of the shipyard and berths near the I.C.R. tracks. The total amount of dredging in channel and basin is 10,000,000 cubic yards.

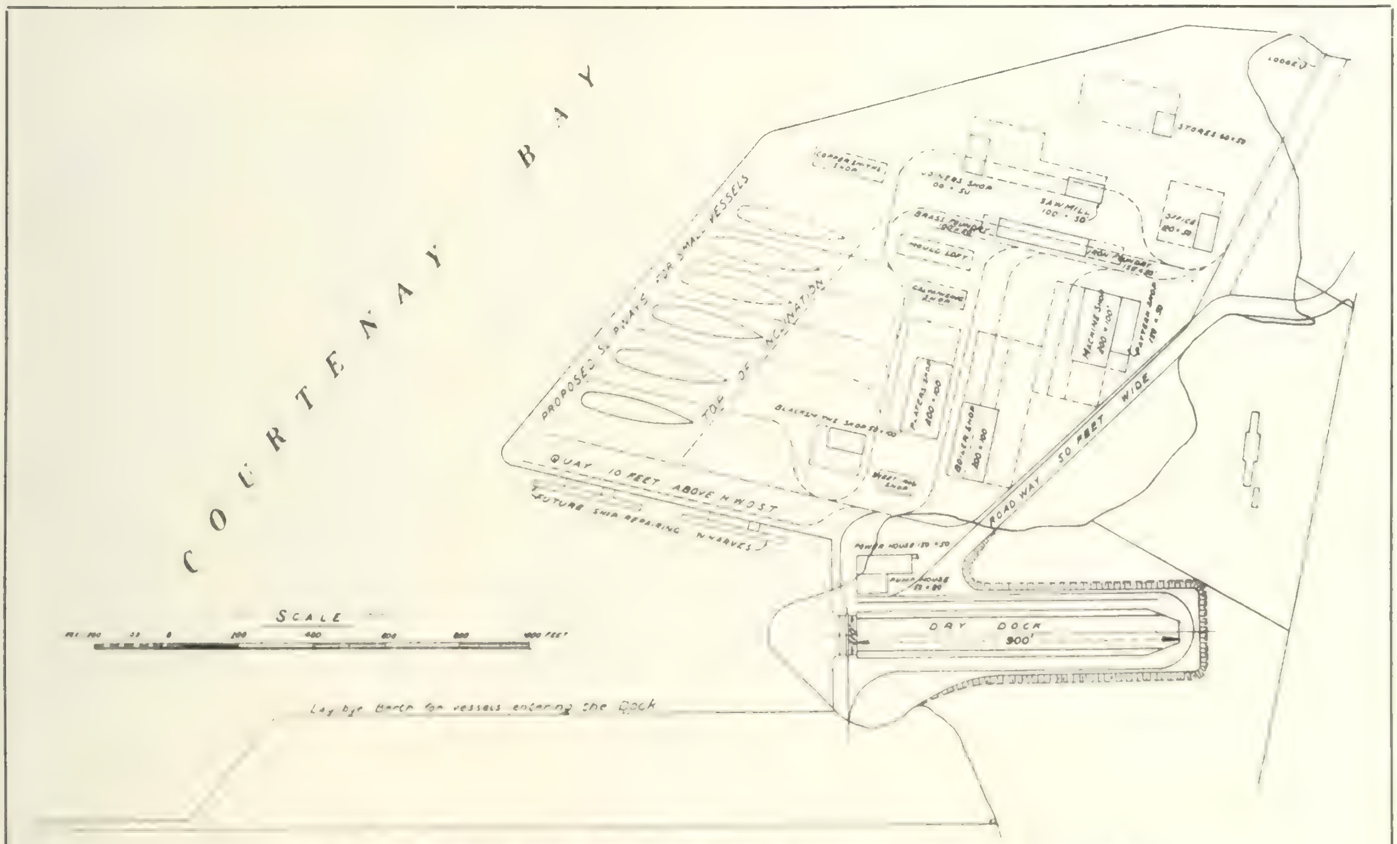
The construction of the dry dock will now be well in hand. The side walls and bottom will be of 6 to 1 concrete, and where the concrete and rock join each other a seal of 4 to 1 concrete will be placed along the sides of the dock. The face work of all concrete on the inside of the dock will be of 4 to 1 concrete 6 inches thick. The copings 3 ft. 0 in. x 1 ft. 6 in. and altars 2 ft. 0 in. x 1 ft. 0 in. will be of the same quality of concrete. A keel block course 9 ft. 0 in. wide and two bilge block courses 6 ft. 0 in. wide by

21 inches thick will be put along the floor of the dock.

The dock will be a first class one under the Subsidies Act and will be 900 ft. long with an entrance of 110 feet and depth of water over sill of 35 feet at high water. An outer caisson stop will be provided which will increase the length of the dock to 923 ft. 6 in. The entrance to the dry dock will be closed by a ship caisson 110 feet wide and 44 ft. 6 in. in height. The deck will be 15 feet wide and will have a track to allow railway traffic to be transferred from one side of the dock to the other.

The water from the dock will be discharged into the basin by three electrically driven pumps of the centrifugal type, 54 in. dia., which will empty the dock when full in 4 hours. The water from the dock passes through an emptying culvert 12 feet by 8 feet into the suction culvert 20 feet x 16 ft. 6 in. high. The water then passes through the pumps to a main discharge chamber and then into the non-return valve chamber. From this chamber the water passes through two 10 feet dia. culverts to the basin. The main pumps lower the water to floor level of dock, the remainder being pumped out by smaller drainage pumps, also of the centrifugal type. The water is let into the dock through two filling culverts 8 feet high by 5 feet wide situated on each side of the entrance. The emptying and filling culverts are provided with the necessary penstocks which are worked electrically. The pump house, which is situated near the entrance to the dock, is 80 feet long by [illegible] feet wide, the floor level of which is 8 feet above the level of low water.

On the site for the shipyard, which is to be reclaimed, repair shops including machine, platers, boiler shops, etc., will be built and fitted up with the



Plan of Dry Dock and Ship Repairing Yard, Courtenay Bay, St. John, N. B.

[illegible] the large appliances and tools for repair of vessels coming into the Port of St. John. With the terminals of G.T.P., I.C.R., and C.P.R. all focussing on this port and the construction of the St. John Valley Railway, it will soon be found that the facilities of the 22 berths in Courtenay Bay, and also the berths now under construction in St. John West, will all be required to meet the developments of St. John, which will make it one of the largest and busiest harbors in the world.

The Chief Engineer of the company is Mr. P. R. Warren who will be in charge of the work. Mr. Warren recently spent ten years in Singapore carrying out some of the largest dock works in existence. The Norton Griffiths & Company, Limited (Canada), have their office in Montreal at 502 Mark Fisher Building, in which the plans and estimates in connection with the contract have been made. The head office of the company is in Vancouver, B.C., which is also the head office of the Norton Griffiths Steel Construction Co., Ltd., who are erecting some of the largest steel and ferro-concrete buildings in that city and other works on the West Coast.

Municipal Work at Montreal

In their annual report the Controllers of Montreal give particulars of the new works proposed and carried out last year. These include the letting of contracts for the new filtration plant, the organization of the Electrical Service Commission to put wires underground, the obtaining of power for the city to tender on pavement works, the laying of a water conduit, etc. The city constructed in 1911, 85,817 square yards of pavement as follows: 50,455 square yards by day labor, and 35,372 square yards by contract. The city began, and has not yet completed 63,449 square yards of pavement.

The city has waited for the following pavements to be commenced immediately in the spring:—By day labor, 50,126 square yards; by contract, 65,086 square yards; a total of 115,212 square yards. In 1911 sidewalks were constructed as follows: by day labor, 42,215 square yards; by contract, 21,825 square yards; a total of 71,040 square yards. Over and above this amount the following sidewalks have been commenced and not yet completed: by contract, 14,889 sq. yards; by day labor, 10,040 square yards; a total of 24,929 square yards.

In the water department a programme to expend $677,629 on works was submitted to the Council and passed. The sewer department constructed sewers at a cost of $616,354; this, with the proprietors' share, made a total of $1,441,019.

The Board of Commissioners has been seeking the means of abating the nuisance caused by the dust in the streets and public roads. The Chief Engineer was instructed to make experiments in oiling some of the macadamized roads, in order to establish a basis of comparison as to cost and efficiency between the watering and oiling of streets and macadamized roads. The Commissioners have made inquiries on the sprinkling of streets in some of the important cities of the United States, the medium used in those cities and its costs compared with water.

The Board of Commissioners has considered the question of establishing a testing plant for the cement, asphalt and other materials used for municipal works, and after consideration of the report of the Chief Engineer on that subject, recommendation was made to Council to vote a sum of $3,387.50 for the purposes of establishing such testing plant. That recommendation was approved of by Council.

Personal Mention

Mr. F. M. Rattenbury, architect, Victoria, has received the commission to prepare plans for a number of stations along the British Columbia section of the Canadian Northern Railway.

Mr. D. R. Harris, C.E., has been appointed by the B. C. Provincial Government to make soundings with a view to the preparation of plans and specifications for the construction of the breakwater at Ogden Point, the estimated cost of which is $1,250,000.

Sir William Lindley, M. Inst. C. E., of Frankfurt-am-Main, has been appointed Engineer-in-Chief of the Water Supply and Sewage Committee of the St. Petersburg (Russia) Town Council. He will have charge of the design and construction of water-works and a sewerage system to cost $50,000,000.

Mr. C. W. P. Ramsey, Assoc. M. Can. Soc. C. E., has been appointed Engineer of Construction of the eastern lines of the Canadian Pacific Railway, at Montreal, Que. Mr. Ramsey has been in the engineering department of the Canadian Pacific Railway for fourteen years, and for the past seven years has been in the construction department.

Mr. Richard Grigg, who for four years was British Trade Commissioner in Canada, with headquarters in Montreal, has been appointed Trade Commissioner for Canada at $5,000 a year, with standing as Deputy Minister. This is a new post created for reorganizing the Canadian trade commissioner system. Mr. Grigg will tour the world, visiting all the present trade commissioners of Canada and placing them on a new and broader basis. He will make recommendations for a general improvement of the system looking toward an extension of Canada's foreign commerce.

Among the C.P.R. appointments which went into effect on April 1 were the following: Mr. F. F. Busteed, Winnipeg, general superintendent of the Manitoba division, was made engineer in charge of double tracking and grade revision west of Calgary, with headquarters at Kamloops; Mr. Frank Lee, division engineer at Winnipeg, was promoted to principal assistant engineer; Mr. R. C. St. John, of the engineering department at Winnipeg, was made engineer of maintenance of ways; Mr. J. C. Holden, assistant division engineer at Winnipeg, was promoted division engineer for the Manitoba division, and Mr. C. H. Fox, resident engineer at Fort William, was appointed assistant division engineer for the Manitoba division.

Building permits aggregating in value nearly $500,000 were issued in Winnipeg last week. It is noteworthy that the great bulk of the permits were for residential work. The proposed street car extensions are now under construction. There will be a new belt line in Elmwood and it is expected that a line to Transcona will be recognized as a necessity in the near future. As a result of the decision to have the new exhibition grounds in Kildonan another bridge across the Red River is under consideration.

Catalogue D, 1912, of the Brown Hoisting Machinery Company, Cleveland, Ohio, contains valuable illustrated matter descriptive of the "Brownhoist" tram rail systems, trolleys and electric hoists. During the last few years the overhead system of handling all kinds of material has come into considerable favor with modern industrial plants and railroads. The economy of the system in both large and small installations has been effectively proven. The Brown Hoisting Machinery Company have been specializing in this work for thirty-one years and were one of the first manufacturers in this line. They are prepared to submit information and estimates.

Canadian Contractors and Their Work

The Carter-Halls-Aldinger Company, Limited, Winnipeg — A Young and Aggressive Firm that has Made a Mark in the West

ONE of the youngest and at the same time one of the strongest contracting organizations of Western Canada is The Carter-Halls-Aldinger Company, Limited, of Winnipeg. From time to time we have published descriptions of some of the more important work carried out by this firm. Their operations during 1911, which comprised work valued at something like two and a half million dollars, were reviewed in our issue of February 14, 1912.

To many of our Western readers one or all of the members of this aggressive young firm will be familiar, for while some of their biggest jobs have been Winnipeg contracts, they have gone far afield for many of their contracts. In Fort William, at Brandon, at Saskatoon and Calgary, and at Edmonton, there are imposing structures which stand as a permanent monument to The Carter-Halls-Aldinger Company. The firm are well known in countless smaller cities and towns, and in railroad circles they have a reputation of their own. Much might be said concerning the resources and equipment of the firm, but we have no desire either to embarrass the members of the company or to cover that with which our readers are familiar. We are enabled, however, to give some biographical facts concerning Messrs. Carter, Halls and Aldinger, which will doubtless be of interest.

Mr. W. H. Carter
President and General Manager

Mr. Frank E. Halls
Secretary-Treasurer

Mr. A. H. Aldinger
Vice-President and Engineer

Mr. W. H. Carter, the President and General Manager of the firm, was born in Illinois and educated in the public schools of that state. His first experience on construction work was obtained with the United States Government. Later he was employed by Messrs. M. Yeager & Sons upon the construction of court houses and other public buildings throughout Illinois and Iowa. In 1902 he accepted a position with the Wm. Grace Company in Chicago, where he remained for one year, after which he went to Winnipeg for the same firm to take charge of their contracts for the construction of roundhouses and shops at various points in Western Canada for the Canadian Pacific Railway, and also to superintend the erection of the Bank of British North America in Winnipeg. Mr. Carter was manager of the William Grace Company in Winnipeg until 1907, when The Carter-Halls-Aldinger Company was organized. Mr. Carter is an ex-President of the Winnipeg Builders' Exchange and a member of the Winnipeg Industrial Bureau and of the Winnipeg Board of Trade. He shares with his partners the faculty of indomitable energy, and as an organizer in the handling of large undertakings he has met with unqualified success.

Mr. A. H. Aldinger, Vice-President and Engineer of the Company, is a native of Stuttgart, Germany, and is in his 35th year. Coming to America early in life he was educated at the public schools of Indiana, after which he took a four years' course in civil engineering, graduating in 1898. After graduation he worked for one year in the Burlington Railroad Bridge Department. From there he went to Messrs. D. H. Burnham & Company's office as structural engineer. There his experience for five years covered the design of foundations and steel structures for skyscrapers erected over all parts of the United States. In 1903 he accepted a position as construction superintendent for Messrs. Wells Bros. Company, general contractors, Chicago and New York, with whom he remained until the spring of 1907, when he identified himself with the organization of the firm of which he is now a member. In his present capacity he has designed the foundations for some of the principal buildings in Western Canada. Mr. Aldinger is a member of the Canadian Society of Civil Engineers and also of the Western Society of Engineers.

Mr. Frank E. Halls, the Secretary-Treasurer of the Company, was born in Huron County, Ontario, in 1872, and educated in the public schools of Ontario and the University of Illinois, at Champaign, Ill. For a number of years Mr. Halls was identified with important contracting work at Chicago. He first made connections with that city in 1893 and [illegible] experience was obtained [illegible] work with a general contracting firm. Later he became a draughtsman and estimator. In 1898 he became superintendent of construction for the Illinois Terra Cotta Lumber Company, of Chicago, with whom he continued for nine years. During the last four years that he was associated with this firm he was general superintendent, with entire charge of the company's fireproofing operations on their numerous contracts in Chicago and other cities in the central west. Mr. Halls entered the Carter-Halls-Aldinger Company at its inception in 1907. He is aggressive in business and is a recognized authority on fireproof building construction.

Canadian Railroad Development

Construction will be commenced this season on a 10-storey office building for the C.N.R. at the corner of Toronto and King streets.

Messrs. Eslich & Hartnett, of Spokane, Wash., have begun moving their outfits to the vicinity of Fort Steele, B. C., where they have a sub-contract for building 25 miles of railroad for the Canadian Pacific.

Four thousand men employed on C.N.R. construction in British Columbia went on strike last week. The men have been getting from $2.50 to $3.25 for a 10-hour day. They asked a mimimum of $3 for a 9-hour day.

Mr. John Timothy, Edmonton, Alberta, will sublet about 400,000 cubic yards of the work on his contract for the Canadian Pacific Railway from Lethbridge east. This contract includes some 750,000 cubic yards of earth excavation.

A resolution is before the Dominion Parliament providing for the payment of a subsidy of $6,400 per mile for the main line and branches of the Temiskaming & Northern Ontario Railway, aggregating 300 miles. The total subsidy will therefore be $1,920,000.

Government subsidy has been asked for a railroad which it is proposed to construct to the Yukon. As projected the line is to run from Haines Mission to Fairbanks, Alaska, skirting the coast for 40 miles to the Canadian boundary with a branch line to Dawson.

The Edmonton, Dunvegan & Peace River Railway, of which Mr. J. D. McArthur, of Winnipeg, Man., is president, has surveys under way for the proposed line to Peace River. Two parties are working from Edmonton, and one of them at last reports had got as far as the Athabasca River.

Much interest is being taken in the C.N.R. for the construction of a tunnel under Mount Royal. The tunnel is to be double-tracked and will be about three miles in length. It is hoped to complete it by the end of December, 1913, the date set for the completion of the whole C.N.R. transcontinental system from Quebec to Vancouver.

It is understood that about thirty sub-contracts will be awarded on the Deeks & Hinds contract for the construction of the new Canadian Pacific Lake Shore road, which involves construction to the extent of 198 miles and an expenditure estimated at $10,000,000. There will be a number of tunnels on the work, the largest of which will be about 850 feet in length.

Confirmation has been received that the Canadian Pacific Railway Company will build another elevator on the west side at St. John, N. B., this year, with a capacity of a million bushels, double that of the present buildings. Mr. William Downie, general superintendent of the Atlantic division of the Canadian Pacific Railway, states that the work will be started this year. Some preliminary work in preparing the foundation has already been done.

Messrs. McCaffery & McQuigge, Toronto, have been awarded the contract at about $180,000, for constructing the roadbed for the Elk Lake Branch of the Temiskaming & Northern Ontario Railway. This line is about 30 miles long and is to run from Earlton, Ont., to Elk Lake. The contract includes 420 acres of clearing, 75 acres of close-cutting, 75 acres of grubbing, 1,000 cubic yards of rock excavation, 340,000 cubic yards of earth excavation, and two trestles.

As far as possible all the machinery and apparatus to be used by the Canadian Northern Railway in constructing the double track tunnel under Mount Royal, Montreal, will be Canadian built. According to Mr. S. P. Brown, the engineer in charge, where the company cannot obtain the equipment wanted in the Dominion, it will have to be specially made in this country. "When the Canadian Northern Railway tunnel is completed, Canadian brains and labor will have built it," added Mr. Brown.

The Grand Trunk Pacific has at present 19 new stations under construction along its lines, and it is expected that all of them will be completed and ready for service before the spring rush of passenger traffic sets in. The names of the towns at which these stations are being built ars as follows: Pacific Junction, Beaudry, Cabot, Elie, Harte, Knox, Imrie, Hargwen, Obed, Roundcroft, Jasper House, Henry House, Fort Qu'Appelle, Zehner, Parkgate, Victoria Plains, Dorenlee, Ardley and Fitzhugh.

The Natural Resources Department of the Canadian Pacific Railway has made the announcement that the contract will be let for what is said to be one of the engineering feats on the American continent. It is for the construction of a cement flume two and a half miles in length, 16 feet wide and 10 feet deep. It will be erected on pillars some sizteen feet in height. It is to be built in connection with the company's irrigation projects at Bassano, Alta., and will be used to carry water across a valley two and a half miles in width. It will be the main waterway of the system.

The Haney, Quinlan & Robinson Company, contractors, who are building the new Grand Trunk Pacific car shops at Transcona, Man., are receiving daily shipments of lumber from the West, and this is rapidly being put into place by a large force of workmen. Already the steel columns for the new addition are in place and Engineer Pintsch is busy getting everything ready for the advent of the J. D. McArthur work trains, which will again start work on the unfinished tracks about April 15th. At McArthur's repair shops and engine sheds near St. Boniface a large force of men is hurrying the work of putting the construction work in shape for the summer's campaign.

Owing to the opposition of the Montreal Council, the application of the Montreal Central Terminal Company for approval of the route map of its proposed tunnel under the St. Lawrence has been postponed for three months by the Federal Minister of Railways. The scheme is in connection with the Central Railway Company of Canada and is designed to give the latter a connection with the South shore when the line is built. Much of the land has already been acquired. The plans are only of a preliminary character, and show a tunnel under the St. Lawrence River from Jacques Cartier Junction on the north to St. Hubert's Junction on the south. The tunnel will pass east of the mountain about Fullum street, and will be eight or nine miles long and cost $9,000,000. A big terminal will be erected in some central location in the down-town section of the city.

Mr. Justice Lavergne, sitting in the Court of the King's Bench in Appeal, Montreal, quashed the judgment of Judge Leet in the case of Jules Gratton, who, during the builders' strike in August last, was sentenced to five days' imprisonment on a charge of intimidation. Mr. Justice Lavergne drew a difference between picketing and intimidation, and held that the offence had not been proved owing to the prejudiced character of the testimony in the case.

Construction News and Notes

Projected improvements to be made on the Toronto harbor this season by the Dominion Government involve a sum of nearly $250,000.

A bill providing for the expenditure of half a million dollars on road work in Nova Scotia was introduced in the Provincial Legislature last week by the Commissioner of Works and Mines.

The Toronto building permits for the first quarter of 1912 showed a slight increase over those issued during the corresponding period of 1911, the totals being $3,665,830 and $3,638,940 respectively.

Montreal Building permits for last month were 163, of a total value of $619,480, and for alterations 77 and $71,969. These compare with last year as follows—new buildings, 160 permits and $933,014, and alterations 87 and $168,563.

It is stipulated that each company tendering must enclose with its tender a report of its engineers, establishing the respective advantages of the Levis and St. Charles River sites. Tenders must be in before the 20th of May.

The Federal Government will at once call for tenders for the construction of an immense dry-dock at Quebec, under the provisions of the Dry Dock Subsidies Act. The dimensions will be: 1,150 feet long, 110 feet wide, and at least 37 feet deep.

The controllers of the Montreal Council have submitted their programme of the summer's paving work. This provides for the expenditure of $1,011,300 and the laying down of about 65,000 square yards of macadam and granite. The proposal is to lay the granite on thoroughfares frequented by heavy traffic.

At Victoria a permit was recently issued for the 7-storey building which will be erected at the corner of Humboldt and Government streets, at a cost of $400,000, by the Norton-Griffiths Company, according to plant prepared by Messrs. Horton & Phipps. The building will be of reinforced concrete construction and will be devoted to stores, offices and apartments.

Healthy activity in all classes of building work is reported from Ottawa, where there is every prospect of a great year for the constructional interests. The leading architectural firms are particularly busy with residential work, while commercial buildings, such as factories and offices, follow very closely. New apartment houses will be much in evidence this season, especially in the outskirts of the city, in Ottawa South and Ottawa East. In Ottawa South it is expected that there will be quite a boom in house building, as a result of the construction of the Bank Street Bridge. One of the more noteworthy buildings upon which a start will be made early this spring is the ten-storey Blackburn Building, on the corner of Sparks and Metcalfe streets. The steel for this structure has been awarded to the Dominion Bridge Company, who have promised completion by the middle of June. Preliminary sketches for several new churches are being prepared.

A deputation from Quebec, representative of many interests, on March 29th, waited on Messrs. Borden, Monk and Pelletier, at Ottawa, and requested the Government to erect, or have erected, a dry dock at the port. In the course of his reply, Mr. Monk admitted that a dry dock was an absolute necessity for the port, and stated further that the government would ratify the decision of the engineers as to a site. The government were willing to subsidize a company which would undertake the work. It is probable that the dock will be constructed on the north shore or what is known as Beauport Bay.

It is understood that plans for the enlargement of the Welland Canal involving an expenditure of [illegible] will be prepared this summer. It is hoped to call for tenders in September. The plans will conform in the main to the recommendations of the superintendent of the Welland Canal System, Mr. J. L. Weller. The canal will be widened and deepened on the existing route from Port Colborne to a point a little north of Thorold. From there a new cutting will be made, carrying the canal for a distance of some five miles to Ten Mile Creek, crossing the present route and the railway. The new Welland will have six or seven locks instead of twenty-two, and the reaches will be deepened to twenty-four or twenty-five feet, a depth of thirty feet over the sills being provided in the locks. The canal will probably be widened to two hundred feet.

Mr. Frank Campbell, of 815 Bathurst street, reports a gratifying demand for Electrical paints and waterproofings. These products have been used extensively on many important undertakings in the province. The departments of the city engineer and city architect have specified them in numerous works, notably for waterproofing purposes. Among other large users may be mentioned the Ontario Power Company, the Hydro Electric Commission, the Coniagas Company and the Consumers' Gas Company, also various breweries. Elaterite is is particularly recommended for the coating of condensers and ammonia pipes. It can be used wherever any other paint can be applied, and it is especially desirable for use in priming coats upon woodwork where light shades are desired, and for a preservative covering for both wood and metal where the surfaces are exposed to climatic conditions or the action of acids, steam, vapors, etc. As a waterproof, acid-resisting application it is considered unequalled for the coating of pipes. Further information may be obtained from Mr. Frank Campbell,who is the Canadian sales manager for the Elaterite Paint Manufacturing Company, Des Moines, Iowa.

Good Roads in Manitoba

An act has been introduced in the Manitoba Legislature which asks for a grant of $200,000 from the government for good roads. Any municipality wishing to avail itself of the provisions of the act shall make application to the Highway Commissioner, who shall draw up a scheme of improvement, which must be finally approved by the Council of the municipality. The Council shall then have authority to pass by-laws for the sale of debentures, but it was agreed between the delegation and the Premier that a clause will be added to the act making it necessary to submit these by-laws to the electors. All by-laws passed and debentures issued under the authority of this act must be approved by the Municipal Commissioner. The government has power to guarantee the payment of the debentures, or to invest its funds in the purchase of debentures. The act will provide that all works done under the act are to be let by contract by the Municipal Council after due advertisement, to the lowest responsible tenderer. The Council of any municipality may form areas not in any case larger than one township, which shall be known as good roads districts unless a majority of the owners of the property affected file an objection. The Council shall have power to make improvements in such districts, and to determine what percentage of the cost shall be borne by the property immediately benefited, and what percentage by the municipality at large. Debentures which are issued to cover expenditures in good [illegible] Besides agreeing to this act practically as drafted, Premier Roblon announced the intention of the government to increase the good roads allowance from $100,000, the amount paid last year, to from $150,000 to $200,000 this year, and promised to introduce legislation to this effect before the close of the session.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

North Battleford, Sask.

Tenders are called for water and light plant extension, cost $17,000. Engineers, Chipman & Power, Mail Bldg., Toronto. Superintendent, M. D. Caldwell, North Battleford. Tenders open until May 15.

Ottawa, Ont.

The Ottawa Improvement Commission have decided to construct a modern driveway around the Royal Shantey at Rockcliffe at a cost of $10,000.

St. Boniface, Man.

Tenders are called for sewer diversion for Transcontinental Railway, Ottawa, Ont. Plans and specifications and forms of tenders may be obtained at the above office on application to Mr. Gordon Grant, Chief Engineer. Tenders must be made on the form supplied by Commissioners, accompanied by marked cheque for 10 per cent. of the amount of tender. The right is reserved to reject any or all tenders. P. E. Ryan, Secretary, Ottawa, Ont., until noon, April 15th.

Stratford, Ont.

Tenders are called for sidewalks and paving to cost $25,000. Received by the Board of Works up to April 15, 1912.

Ste. Therese De Blainville, Que.

Plans are in preparation for waterworks system, cost $75,000. Engineers, Ouimet & Lessage, 15 St. Lawrence Blvd., Montreal, for The Aqueduct Co. of Blainville. Plant will be run by electrical energy.

Toronto, Ont.

The following waterworks construction has been approved:

Two 36-in. mains under tracks, main pumping station to Front street.

42-in. mains, Front to Bathurst sts.

24-in. main, Niagara to Queen sts.

36-in. cross town line to Beverley st.

Two 15-million gal. triple expansion pumping engines with buildings and connections, $350,000.

Tenders will be received till noon, April 19, by Chairman of Board of Control for the construction of several concrete walks throughout the city.

Windsor, N.S.

The Town Council are applying to the Legislature for authority to borrow the sum of $35,000 for extension to waterworks system. Tenders mill be called immediately when amount of loan is authorized. Town Clerk, J. C. Gelbert.

Plans are ready for sewer extensions to cost $17,500, for the town of Windsor. Town Clerk, J. C. Gelbert, Windsor. Tenders will be called shortly.

Wingham, Ont.

Plans are ready for waterworks extension. New wells are being sunk and new mains being made, also number of new services will be installed later on. Mayor Spotton is in charge of the arrangements.

CONTRACTS AWARDED

Winnipeg, Man.

Contracts are awarded for road materials. Engineer, H. M. Ruttan, 232 James avenue. Contractors, Alloway & Champion, Winnipeg. 2,500 to 3,000 tons refined asphalt; 77 tons Fluxing oil. Canadian Mineral Rubber Co., Toronto, 1,200 to 1,500 tons asphalt cement.

Port Arthur, Ont.

Sub-Contracts awarded for steel dock, cost $40,000, for Canadian Northern Railway, King street, Toronto. General contractors, Barnett & McQueen, Fort William, Ont. Sub-contract for piling, etc., awarded to Thunder Bay Harbor Improvement Co.

Railroads, Bridges and Wharves

Fort William, Ont.

Plans are ready for alterations to city docks to cost $3,000. City Engineer, Jno. Wilson, Fort William. Form of tenders and specifications may be had from Engineer's office.

Fredericton, N.B.

Commissioner's Department of the C. P.R., Montreal, have purchased 400 acres of land at Fredericton Junction. Modern buildings will be erected and equipment suitable for raising stock, etc., also for dairying work and raising fruit and vegetables. Equipment supplying dining-car service will be required.

Port Colborne, Ont.

The Grand Trunk Railway are considering the enlargement of the local yards.

Sarnia, Ont.

Tenders are open for wharf and dredging basin here. Received by J. G. Sing, Confederation Life Bldg., Toronto. Dist. Engineer, H. J. Lamb, Windsor.

Windsor, N.S.

The town is contemplating the construction of a dam to cost $15,000. Clerk, J. C. Geldert, Windsor, N.S.

CONTRACTS AWARDED

Trenton, Ont.

The Canadian Pacific Railway have awarded to F. R. Wilfrid, Lindsay, Ont., the contract for construction of line from Trenton to Belleville.

Public Buildings, Churches, Schools, etc.

Arthur, Ont.

The offer of a free site on Union street has been accepted by the Public Library Board, and when Council passes 10 per cent. maintenance clause architect will be decided on to prepare plans for the new library at a cost of $7,500.

Battleford, Sask.

Plans are accepted for Collegiate to cost $78,000. Architect, Danial Webster, Saskatoon. Concrete foundation, brick and stone, fireproof construction, steam heating, electric lighting. Tenders will be received by architect.

Dundas, Ont.

The Salvation Army are contemplating an addition to present barracks and installation of additional seating capacity.

Fort Frances, Ont.

Plans for an 8-roomed brick school with basement with addition to be added later. Tenders will be called by Public School Board. Chairman, Dr. R. Moore.

Hamilton, Ont.

W. E. N. Hunter, architect, 5 Sandwich street, Windsor, has plans for a new church at Hamilton and is asking tenders on masonry, carpentry, painting, glazing, plumbing, heating and lath and plaster. Approximate cost $100,000. Plans, &c., at office of the architect or from Dr. Day Smith, cor. Main and Victoria avenues, Hamilton, Ont.

Kentville, N.S.

Plans are ready for Hospital to cost $3,000 for Dr. Miller Sanitorium. Several cottages are to be erected and repairs and extensions made to main building.

Medicine Hat, Alta.

Tenders are called for erection of St. Barnabas Church, cost $25,000. Secretary, J. H. Collier, Medicine Hat. 73 ft. 9 in. x 120 ft., brick and terra cotta construction, steam heating, electric lighting, modern plumbing. Received by architect, close April 12, 1912.

Montreal, Que.

Tenders are called for school, Esplanade and Van Horne avenues, for Protestant School Board. Architect, Nobbs & Hyde, 49 Beaver Hall Hill, Montreal. 3-storey, fireproof, 24 class-rooms. Tenders for superstructure closed April 1, 1912.

Muncey, Ont.

Tenders are called until May 1st for schools. Plans and specifications may be seen at office of School Principal at Muncey, Indian Agent at Delaware, Post Office, London, Ont., St. Thomas and Hamilton; J. T. Sing, Confederation Life Bldg., Toronto. Tenders must be accompanied by 10 per cent of amount of tender, forfeited if tenderer declines to enter into contract. Returnable if tender is not accepted. Address to Sec. and marked "Tenders for Schools at Muncey. Depart. of Indian Affairs, Ottawa. Secretary, J. D. McLean.

North Battleford, Sask.
Tenders are called for the erection of a new 4-room school, cost $30,000, for The Public School Board. Architect, Mr. Byers.

Ottawa, Ont.
The city is contemplating a machinery and agricultural hall in Lansdowne Park. Architect, W. E. Noffke, Central Chambers, Ottawa. Tenders held up at present until word has been received from Legislature with regard to debentures.

The trustees of Presbyterian Church, Billings Bridge, have acquired property on Sunnyside ave. and intend to erect a church to cost $50,000.

Architect F. C. Sullivan, Sparks street, has been authorized by the Separate School Board to prepare plans for alterations to schools.

Red Deer ,Alta.
Plans are in preparation for hospital extension, cost $15,000. Construction of brick and concrete, steam heating ,electrical lighting, tar and gravel roofing, hardwood flooring. Secretary of Hospital Board, A. W. G. Allen. Architect, C. A. J. Sharman.

Regina, Sask.
Plans are being prepared for addition to hospital to cost $75,000. Commissioner, F. Haultain, Gen. Hospital, Regina. New addition to include a new heating plant and complete laundry equipment.

Sarnia, Ont.
Plans are in preparation for remodelling Court House to cost $15,000. Engineer, Mr. Fosette. Plans and specifications may be had on application to Engineer.

Swan River, Man.
Work has started on a school for Swan River School District No. 1047. Sec.-treas., C. A. Lewis, Swan River. Architect, E. D. Tuttle, 701 McArthur Block, Winnipeg. Six rooms, brick construction, concrete foundation, hot air heating and shingle roofing. Foundation completed last fall. Work is being done by day labor.

Toronto, Ont.
Subscription is being taken for erection of a new Baptist church to cost $40,000, N.W. cor. Jones and Danforth.

Riverdale Methodist Congregation, Gerrard street, corner River, contemplate the erection of a new church to cost $25,000.

Tenders are open for trades required for erection of St. Albans Cathedral, Howland avenue. Architect, Symonds & Rae, Toronto street. Received until April 22nd.

Firehalls will be erected on Greenwood avenue, $30,000; Wychwood ave., $30,000; Roncesvalles avenue, $20,000; Adelaide street, $25,000, spare stable and storehouse. Earlscourt, $25,000.

Plans are completed for picture theatre, cost $18,000, Bloor street west. Brass handrails, ornamental brass work, terra cotta, stucco. Architects, Redmond & Beggs, Kent Building.

Tenders are open for Separate School containing 4 rooms on Carlaw avenue, for Separate School Board. Architect, C. J. Reid, Confederation Life Bldg. Brick, tar and gravel roofing, steam htg., electric light, plumbing.

Tenders are open for three picture theatres. Mirrors, ventilators, art glass, exterior marble, operators' safety boxes, asbestos curtains, also price on a saturation cooling plant. Architects, Redmond & Beggs, Kent Bldg.

Tenders are open for fire hall and fire station to cost $40,000, Exhibition grounds. Architect, Geo. W. Gouinlock, Temple Bldg. Brick, cut stone trimmings. Tenders called April 10, 1912. Plans with architect. Address Chairman of the Board of Control.

Tenders are open for moving picture theatre to cost $6,000, Crawford & College streets, for Herman, Adelaide St. W. Architect, S. Yollis, Simcoe street. 2-storey, brick, structural steel, cut stone, hardwood finish, stucco, plastic relief work, plate and art glass, tar and gravei roof.

Plans are drawn for public school, cost $100,000, Clinton street. Three storeys and basement, solid brick, tar and gravel roofing, structural steel, skylights, cut stone, terra cotta ,tile floors, fire escapes, hardwood finish, concrete floors, slate blackboards, fireproofing, metal and sash and lath, sliding doors, plate and art glass, galvanized cornice and copper, ornamental iron. Architect, C. H. Bishop, City Hall.

Windsor, Ont.
Plans are ready for moving picture theatre to cost $20,000, Pitt street, for J. M. Ward, c/o Avenue Theatre, Detroit, Mich. 68 x 65, building to seat 1000 people, all seating equipment, interior fittings, electric lighting, steam heating and other apparatus will be required.

Winnipeg, Man.
Tenders are called for moving picture theatre for C. Vanderlip, Grain Exchange. Architect, A. & W. Mellville, Builders Exchange. 2-storey, 50 x 120, brick, stone and steel, steam heating, electric light, felt and gravel roofing, ornamental plaster and maple floors, stage fixtures undecided.

CONTRACTS AWARDED

Alexander, Man.
School to cost $19,000 for Public School Trustees. Architect, Shillinglaw & Marshall, Brandon. General Contractor, Snyder & Sutherland, Portage La Prairie, Man. Heating contractor, The Rutly Co., Toronto. 2-storey, 6 rooms, brick, stone, hot air heating, shingle roofing.

Brantford, Ont.
Skating and curling rink, cost $15,000, Alfred avenue, for Robert Trench, Teeswater, Ont. 92 x 210, two floors and galleries, concrete walls, 8 feet high, arched roof, covered with(corrugated iron, the lower floor to be of concrete. Architect, George H. Hall, Brantford. General contractor, R. Trench, Brantford.

Calgary, Alta.
School to cost $172,000 for The Calgary School Board. Superintendent, Mr. McLellan. General contractors, Doyle & Thomson, 20 Elma Block, Calgary. [illegible] rooms, [illegible] x 110, fireproof, hollow tile and concrete floors.

Eastview, Ont.
[illegible] has started for school for Separate School Board. Architect, F. C. Sullivan, Queen street, Ottawa. Gen. contractor, Robert & Whyto, Eastview, Ont. [illegible] storey, [illegible] x [illegible], concrete foundation, brick, steel and concrete, tar and gravel roof, electric light. Direct and indirect radiation.

Galt, Ont.
Y. M. C. A. Building, cost $45,242.50. Three storeys, pressed brick with white stone trimming, structural iron, concrete foundation, steam heating, electric lighting, composition roofing, marble finish for interior walls and stairways. Local secretary, W. R. Cook. Architects, Shattuck & Hussy, Chicago and Toronto. General contractor, A. E. Faulkner, Brantford, Ont.

Montreal, Que.
Contract is awarded for Club House to cost $70,000, cor. Belmont and Stanley streets, for Winter Clubs Limited. Architect, E. & W. S. Maxwell, Beaver Hall Square, Montreal. Contractor, E. G. M. Cape, Beardmore Bldg., Montreal. Roofing contractor, Richardson Simard Co., 129 Elgin street. Iron work, Dominion Bridge Co., Lachine. 3-storey and basement, 72 x 237 ft. 5½ in., concrete foundation, brick and stone, steam heating, electric lighting, tar and gravel roofing with glazed tile cornices.

School addition to cost $37,000, Sarah Maxwell School, for Protestant School Board. Gen. contractor, E. G. M. Cape, Beardmore Bldg., Montreal. Plumbing, W. J. McGuire Co., 232 Craige street w. 3-storey, 49½ x 64½, concrete foundation, brick and stone and concrete construction, steam heating, electric lighting, tar and gravel roofing, concrete floor. New wings to be absolute fireproof construction. The iron work contract went to Phoenix Bridge & Iron Works Ltd., 83 Colborne street.

Ottawa, Ont.
Smallpox Hospital to cost $40,000, Porters Island. Architect, F. C. Sullivan, Queen street, Ottawa. General contractor, Geo. Grain, Cremow ave., Ottawa. Contractor, J. P. Band, Bank street, Ottawa. Plumbing and heating, including direct and indirect radiation is awarded to Mr. Band. 3-storey, 107 x 37, brick and concrete, concrete foundation, terra cotta facing, electric lighting, composition floors.

Saskatoon, Sask.
Church and rectory, cost $130,000, Spadina Crescent, for St. John's Parish. Nave, 56 feet wide, transepts, 30, length of nave 150 feet, chancel, 28 x 40 feet, seating capacity 1,000, stone foundation, brick construction, terra cotta facing, vacuum steam heating, electric lighting.

Sherbrooke, Que.
Contract for plumbing and heating Lennoxville Academy has been awarded to A. K. Wilson & Co. of Sherbrooke. [illegible]

Work has started on Sunday School Bldg. to cost $13,000, on Court street, for Methodist Church Board. 2-storey, 40 x 60, stone foundation, brick and stone construction, hot air heating, fan system, electric lighting, gravel and patent roof, wood finish.

Toronto, Ont.
Contract is let for public school, cost $160,000, on Morley avenue, for Board of Education, City Hall. Architect, C. H. Bishop, City Hall; masonry, Bayless & Son, $53,200; cut stone, Jno. Vokes, terra cotta, Robt. Bennett; carpentry, Wm. Williamson, $22,545; roofing, W. I. Dillon Co., Ltd.; plastering, Geo. White, $5,294; paint and glass, J. R.

Robinson, $2,630; stairs, Can. Ornamental Iron Co., Ltd., $4,500. Three storeys, solid brick, structural steel, cut stone, terra cotta, ash doors, tile floors, concrete floors, blackboard, steel sash, plate and art glass, galvanized iron and copper, ornamental iron.

Residences

Brandon, Man.

A. E. Bullock, 18th and Victoria ave., Brandon, is planning to erect 12 houses —concrete foundations, frame construction, steam heating, electric lighting, tar and gravel roofing with modern fittings.

Burlington, Ont.

Tenders are called for 4 residences to cost $16,000, for W. C. Flatt, Federal Life Bldg., Hamilton. Architect, Mills & Hutton, 2 Bank of Hamilton Bldg. Tenders received at Architect's office.

Messrs. Coates & Sons are having plans prepared and work will start shortly on the erection of a number of bungalows and garages. New equipment will be required.

Calgary, Alta.

Plans are ready for 2 residences to cost $7,000 for Mrs. C. F. M. Brydon, 1915 12th street west. 2-sty., 27x26. concrete foundation, frame construction, hot air heating, electric light, shingle roof.

Plans are ready for residence to cost $4,000, Bankview, for J. H. Hall, 12 Alexander Corner. 1-storey, 30 x 30, concrete foundation, frame construction, hot air heating, electric lighting, shingle roofing.

Ottawa, Ont.

Plans are ready for garage and dwelling on Daly avenue, for F. Ahearn, Albert street. Architect, W. F. Noffke, Central Chambers. 1½ storeys, 22 x 25, concrete foundation, brick, steam heating, electric lighting, pitch and gravel roofing.

Toronto, Ont.

Tenders are open for residence to cost $9,000, Cooper avenue, W.S., for S. Rostron, 33 Royce avenue. 2-storey, brick.

Tenders are open for residences to cost $2,500 on Bellfair avenue, for Geo. Jordan, 128 Carlaw avenue. 2-storey, solid brick.

Plans are drawn for a residence to cost $2,500 on Erindale avenue, for Jno. Bray, Don Mills road. 2-storey, brick, shingle roof.

Plans are drawn for dwelling to cost $3,000 on Sheridan avenue, for F. Waite, 174 Sheridan avenue. 2-storey, brick, stone foundation.

Plans are drawn for residence, cost $2,500, Gerrard near Norwood, for McMillan & Costain, 198 Main street. Two storeys, brick veneer.

Tenders are open for dwelling to cost $2,700, 18 Russett avenue, for Alex. A. McLeod, 16 Russett avenue. 2-storey, brick, shingle roofing.

David Warwick, 11 Woodycrest ave., is planning to erect three 2-storey and attic brick residences on Woodycrest avenue, at a cost of $7,000.

Jos. M. Morgan, 33 Frizzell avenue, is planning to erect a 2-storey, solid brick residence on south side of Strathcona avenue to cost $2,800.

Tenders are open for residence, cost $5,000, College Heights, for Scott & Switzer, Lawton avenue. Architect, H. Bryan Gilbert, Frontwell Bldg.

Plans are drawn for residence, cost $2,900, E. S. Pauline avenue, for Hayward & Whitehorn, 6 Hallam street. 2½ storeys, brick, stone foundation.

Plans have been drawn for two detached residences, cost $5.000, 30-32 Ridley Gardens,-for R. J. Rogers, 196 John street. Two storeys, brick, shingle roof.

Plans are drawn for residence to cost $4,500, N.E. cor. Sheridan and Montry, for F. Waite, 172 Sheridan avenue. 2-storey, brick, stone, tar and gravel roofing.

Plans are in progress for detached residence to cost $2,700, 224 Garden avenue, for B. W. Kiteley, 222 Garden avenue. 2-storey and attic, brick, shingle roof.

Plans have been drawn for 2 pair dwellings to cost $8,000 on Annette St., for Waxler & Lavine, 271 Maria street, Toronto. 2-storey, brick, tar and gravel roofing.

Plans are drawn for detached residence, cost $2,500, Barber avenue, for Chas. Bentley, Florence avenue, West Toronto. 2½ storeys, brick, stone foundation, shingle roofing.

Tenders are open for detached residence, cost $4,000, Clara street west of Quebec, for Henry Diesenroth, 58 Uxbridge ave. 2½ storeys, brick, shingle roofing, hot air heating, electric light.

Plans are in progress for dwelling to cost $6,000, Dunbar road, for Mrs. C. A. Stabury, 502 Huron street. Architect, Alexander & Son, 143 Adelaide st. E. Brick, stone foundation, slate roofing.

Plans are drawn for a detached residences to cost $5,000, Van Koughmet street, for H. W. Sharp, 19 Adelaide street east. Architect, J. G. Hedges, 86 Clinton street. 2-storey, brick and shingle, stone foundation.

Plans are drawn for pair residences, cost $5,000, W.S. Dufferin street near Dundas, for W. H. Dean, 5941 Dufferin street. Architect, J. M. Cowan, 65 Adelaide street east. Two storeys, semi-detached, tar and gravel roofing.

Tenders are open for residences to cost $8,000, High Park avenue, for Alex. Heydon, 2014 Davenport road. Architect, Henry Simpson, 82 King E. 2½-storey, brick, tile, steam heating, combination light, mantles and tiles, hardwood finish, electric lighting.

Tenders are open for apartment house to cost $30,000, Glen road, for C. W. Defoe, 47 Simcoe street. Architect, S. B. Coon, Temple Bldg. 3-storey, brick, composition roofing, concrete foundation, steam heating, combination lighting, cut stone trim, mantles and tiles, hardwood finish, electric bells, speaking tubes.

Tenders are open for apartments to cost $8,500, Rowanwood avenue, for Mr. Irland, 118 Bellevue avenue, Toronto. Architect, A. J. Rattray, 123 Bay street, Toronto. 2-storey and basement, brick, structural steel, cut stone, mantles, tiles, hardwood finish, stucco, reinforced concrete, plate and art glass, galvanized cornice, tar and gravel roofing.

Sherbrooke, Que.

Plans are ready for tenement house to cost $3,500, Laurier avenue, for Emile Quinal. 3-storey, 42 x 50, stone foundation, wood construction, hot air heating, electric light, iron roofing, interior finish wood. Work being done by day labor.

G. J. Brow has had plans prepared by Architect G. J. Brown for the erection of a residence. 2-storey, 40 x 50, stone foundation, wood and frame construction, hot water heating, electric light, hardwood floors, gravel. Cost $4,000.

Maisonneuve, Que.

Plans have been prepared for 3 flats to cost $4,500, for Nap. Morin, 267 Aird avenue. 3-storey, 25 x 46, stone and brick, concrete foundation, gas lighting, gravel roofing.

Ottawa, Ont.

Plans are ready for residence to cost $4,000, MacKay avenue, for Geo. Roy, 881 Somerset street. 3-storey, 40 x 34, attic to be 32 x 10, concrete foundation, brick veneer, electric light, ironclad sides.

Plans are ready for 2 apartments to cost $24,000 on Daly avenue, for Fred Diamond, 155 Clarence street. 3-sty. and basement, 40 x 90, brick veneer, stone foundation, electric light, gravel roofing.

Port Burwell, Ont.

Plans are ready for residence for Geo. Weaver. 1½-storey, brick, frame, concrete foundation, hot air heating, electric work. Work will start immediately.

Winnipeg, Man.

Tenders are called for residence, Yale avenue, for J. D. Burnham, 142 Spence street. Architect, D. W. Bellhouse, Canada Bldg., Winnipeg. 2½-storey, 36 x 40, stone foundation, frame and half-timber, hot water heating, electric lighting, shingle roof, oak floors.

Plans are in preparation for residence to cost $12,000, Yale Avenue, for H. B. Byrnes. Architect, H. E. Matthews. 2-storey, 34 x 38, concrete foundation, concrete and brick veneer construction, steam heating, electric lighting, shingle roofing, hardwood floors.

CONTRACTS AWARDED

Calgary, Alta.

Plans are ready for terrace for residences to cost $6,000, Bankview ave., for W. H. Berkenshaw, 603 13th ave. west. Contractor, R. Harrison, 1406 45th ave. west.

Plans are ready for 5 residences for J. W. McDonald. Contractor, owner. 2-storey, 18 x 32, concrete foundation, frame construction, hot air heating, electric light, shingle roof.

Hamilton, Ont.

Plans are ready for 4 houses to cost $6,400, Beechwood avenue, for M. Weightman, 311 Garth street on Beechwood avenue. Contractor, Wm. Theaker, 501 Garth street.

Kentville, N.S.

Plans are ready for residence to cost $3,000 for A. V. Pimo. Brick and stone foundation, wood construction, hot water heating. Contractor, H. R. Best, Kentville, N.S.

Maisonneuve, Que.

Plans are prepared for cottage to cost $3,000, for A. M. Sigouin, cor. Mtl. and Lasalle avenue. Gen. contractor, M. Huderdean, 633 Demonitigny street E. 2-storey, 30 x 36, brick, stone foundation, electric lighting, hot water htg., gravel roof.

Montreal, Que.

Residence, cost $6,000, for F. B. Reid, Builder and architect, H. Hollister, 512 Bay street. Two storeys, 39 x 33, brick veneer and electric lighting.

Apartment house, cost $30,000, for Dr. F. T. Tooke, 368 Mountain street. Architects, McVicar & Heriot, 104 Union avenue. General contractors. Byers & Anglin, 65 Victoria street.

Ten flats, cost $8,000, on Parthenais street. Contractor, E. Masse, 1227 Des Erables street. Two storeys, 50 x 55, stone foundation, stone construction, gas and electric lighting, steam heating, gravel roofing.

Excavation is done for 4 flats to cost $3,600, Dumont street, for Zenon Legault, 218 Jarry street. Contractor is owner. 2-storey, 50 x 35, concrete foundation, brick, gas and electric lighting, gravel roofing.

Work has started on three flats, cost $3,400, Bordeaux avenue, for Charles La Rose, 2129 Bordeaux ave. Contractor is owner. Two storeys, 31 x 42, stone foundation, brick, gas and electric lighting, gravel roofing.

Excavation is done for six flats, cost $4,500, City Hall avenue, for Francis Cote, 10 Demuers street. Contractor is owner. Three storeys, 36 x 35, stone foundation, brick, gas and electric light, tar and gravel roofing.

Residence, cost $2,500, Rochester St., for Elias Joseph. General contractors, Riopelle & Cameron, 38 Charrpayre ave. Two storeys, 23 x 60, concrete foundation, brick and iron clad walls, steam heating, electric light.

Plans are ready for three flats, cost $3,000, St. Andre Lane, for Joseph Legault, 262A Breboeuf. Owner is contractor. Two storeys, 42 x 32, concrete foundation, brick construction, gas lighting and gravel roofing.

Excavation has started on two flats, cost $2,500, Rosemount Boulevard, for Joseph David, 315 St. Joseph Boulevard. Contractor is owner. Two storeys, 25 x 40, stone foundation, pressed brick, gas and electric lighting, gravel roofing.

Plans are ready for residence for A. Beaulieu, St. Laurent. Architect, Dalbe Viau. Contractor, James Doyle. 2½ storeys, 36 x 32, stone foundation, stone construction, hot water heating, electric lighting, asbestos and shingle roofing.

Excavation has started on flats, cost $4,200, St. Jerome street, for J. LaMarche, 1450 Simard street. Contractor is owner. Three storeys, 25 x 40, concrete foundation, wood and brick construction, gas and electric lighting, gravel roofing.

Fifteen flats, cost $11,000, Messier ave., for Cummings & LeBarge, 779 St. Dennis street. General contractor, D. Pacuette, 1219A De la Roche street. Three storeys, 75 x 66, stone foundation, brick and Roman stone trimmings, electric light, gravel roofing.

Excavation has started for residence to cost $11,000, St. Hubert street, for A. Lionais, 42 Jacques Cartier Square. Architect, [illegible] Francois Xavier street. Gen. contractor, A. Filion & Freres, 865 Huntley street. 2-storey, 25 x 96, concrete foundation, brick and stone construction, hot water heating, gas and electric light, gravel roofing.

Church Parsonage, cost $4,000, on Fortune street, for Centenary Methodist Church, 763 Wellington. Architect, P. B. Williams; general contractor, Isaac Collins, 207 Ash street. Two stys., 28 x 43, brick, stone foundation, electric light, gravel roofing.

Residence to cost $3,850, Pine avenue, for W. H. Biggar, 738 Pine avenue. Architect, Saxe & Archibald, Beaver Hall Hill. General contractor, Furse & Gordon, Ltd., 327 St. Antoine street, Montreal. 2-storey, 12 x 18, masonry and cement foundation, hot water heating, brick construction, electric and gas ltg., tar and gravel roofing. Tenders received by architect.

Cottages, cost $12,000, St. Antoine and Hyland avenues, for N. Jasmin, Notre Dame de Grace Ward. Architect, J. Dalbe Viau, 76 St. Gabriel street, Montreal. General contractor, Jas. Dorais, St. Laurent. 2½ storeys, 35 x 48, brick encased, stone foundation, hot water heating, electric lighting, asbestos, shingle roof, hardwood interior finish. Tenders received by Architect until October 24th.

Senneville, Que.

Residence to cost $8,000, Linden Terrace, for W. D. Hooper, 153 Bank st., Ottawa. 3-storey, 36 x 34, stone foundation, brick veneer, shingle roofing, electric light.

Foundation has started on apartments and stores to cost $7,000, Somerset st., for M. Amey and M. Rotstun. Architect, J. P. MacLaren, 104 Sparks street. General contractor, S. J. Hunt, 64 Oliver street. Solid brick construction.

Contracts are awarded for residence to cost $8,500, Monkland avenue, for Alfred J. Stephens, 51 James street. Contractors masonry, Davidson & Rundell. Carpentering, Geo. Eaman, 320 Bronson. Plumbing and heating, J. P. Band, 775 Bank street.

Cottage to cost $4,000 for S. Gamble, Ottawa. Architect, J. P. MacLaren, 104 Sparks street. General contractor, J. Gillespie, Ottawa.

Work has started on tenement house to cost $35,000, Elgin avenue, for E. Wallace, Gilmour street. General contractor, J. A. C. Low, Catherine street. Masonry, J. A. Copeland, Laurel street, Ottawa. Plastering, McLaughlin & Dunn, Ottawa. 3-storey, 52 x 64, brick veneer, stone foundation, electric ltg., hot air heating, tar and gravel roofing.

Work has started on residence to cost $8,000, Lydendan Terrace, for W. D. Hooper, 174 Carling avenue. General contractor, H. J. Hooper. Masonry, Cowie & Moore, 192 Carling. Carpenter, A. C. Burton, McLeod street. Plastering, J. Patterson, 55 Florence street. 2½-storey, 35 x 32, stone foundation, brick veneer front, hot water heating, electric lighting, tar and gravel roofing, oak and beech floors.

Sub-contracts are awarded for residence, cost $40,000, near Montreal, for Dr. J. L. Todd, 261 Peel street, Montreal. Architects, Nobbs & Hyde, Beaver Hall Hill, Montreal. General contractors, Byers & Anglin, 65 Victoria street, Montreal. Plumbing and heating, W. J. McGuire & Co., Ltd., 332 Craig St. W. 2½ storeys, 30 x 40, stone and fireproof material, masonry foundation, hot water heating, electric lighting, slate roofing.

Sherbrooke, Que.

Work has started on residence to cost $4,500, for Chas. G. Brown. Architect, C. J. Brown. 2-storey, stone foundation, brick encasing, hot air heating, electric lighting, gravel roof and hardwood floors.

Work has started on a residence to cost $5,000, Quebec avenue, for W. H. Wiggett. 2½-storey, 35 x 40, stone foundation, brick and wood, hot water heating, electric lighting, iron roofing. Proprietor is building by day labor.

Toronto, Ont.

Alterations to apartment house, cost $2,500, for T. Townsend, 35 Yorkville avenue. Builder. Page & Co. Two storeys, brick.

Residence to cost $2,800, Balsam ave., for A. H. Cox, 142 Balsam avenue. Builder, F. J. Cummings. 2-storey, brick, stone foundation.

Three residences, cost $6,000, W. S. Poucher street, for E. M. Gardhouse, 1218 Gerrard street. Two storeys, roughcast and brick front.

Pair residences to cost $3,800, Harington avenue, for Geo. Brown, 8 Newsham street. Builder, Elliott & Brown. 2-storey, brick, tar and gravel roof.

Fourteen-room residence, cost $28,000, St. Clair avenue, for F. M. Tuckett, 53 Indian Rd. Crescent. Builder, R. Thompson. Two storeys, brick, stone foundation.

Six attached dwellings to cost $10,000, Bruce street, for Frank Hunniset, 214 Crawford street. Builder, W. Williamson, Queen and Woodbine avenue. 2-storey brick.

Residence to cost $5,000, Rose Hill avenue, for J. J. McSweeney, 130 Cumberland street. Builder, Skipper Bros., 52 Greenwood avenue. 2½-storey, brick, shingle roofing.

Work has started on two residences, cost $5,000, east side Vankoughnet St., for H. W. Sharpe, 19 Adelaide street E. Architect, J. Clodwin Hedges, 86 Clinton street. Builder is owner. Two stys., 16 x 38, stone foundation, solid brick construction, cut or art stone trimmings, shingle roof, hot air heating, gas and electric lighting, mantles, plate and art glass and stucco decorations.

Winnipeg, Man.

Residence to cost $45,000 on Crescent road, for Edward Brown. Architect, J. H. G. Russell, McArthur Bldg. Contractor, Geo. Garrow, 633 Furby street. Stone, electric light, tile roof, mahogany finish, oak and pine [illegible] ter heating.

Apartment house to cost $90,000, Dresden avenue. Architect, H. E. Mat[illegible] foundation, reinforced concrete construction, steam heating, composition roofing, hardwood floor.

Contract is awarded for residence to [illegible] Thomas L. O'Brien, Ft. Garry, City. Architect, H. E. Matthews. 2-storey, 33 x 33, frame construction, hot water htg., electric lighting, shingle roof, hardwood floor.

Contract is awarded for residence to cost $200,000, cor. Ruskin road and Park road, for A. R. Davidson, 292 Main st., Winnipeg. General contractor, John [illegible] and mahogany, interior finish. Telephone system, electrical work and boilers.

Business Buildings and Industrial Plants

Berwick, N.S.

Co-operative Companies Ltd., Manager, T. A. Parker, are planning to erect [illegible]

Calgary, Alta.

Shaw & Cooper, Nanton, Alta., are contemplating the erection of a 2-storey brick business block, 150 x 60 feet.

Plans are ready for lumber shed to cost $3,000, for The Revelstoke Lumber Co., Calgary. Architect, Burrowes & Richards. 1-storey, 154 x 150, concrete foundation, frame construction.

Plans are ready for office building, cost $60,000, for The Winnipeg Bible Society. President, Thomas Ryan. Architect, Wm. Bruce, 222 McDermot avenue. Five storeys and basement, brick, stone and steel construction, concrete and stone foundation, steam heating, electric lighting, felt and gravel roof, hardwood floor.

Dundas, Ont.

Plans are being prepared for a large new evaporating plant, box and barrel manufacturing establishment for the Wentworth Orchard Co.; A. C. Caldwell, [illegible]

Fort William, Ont.

The Copp Stove Works, of Fort William, are again enlarging their present plant. A new building, 150 x 70 feet, will be erected. Building operations to commence as soon as weather permits.

Galt, Ont.

Plans are ready for business block for W. B. Ziemann. Architect, H. Gale Legg. Three storeys, 34 x 80, steel beams, metal cornices, hot water heating.

London, Ont.

Plans are prepared for remodelling of mill for The Hunt Milling Co.; Local Manager, J. I. A. Hunt, London. Latest machinery will be installed.

Plans are prepared for addition to enamelling plant to cost $10,000, for Clary Mfg. Co. Local Manager, Col. W. M. Gartshore. 1-storey and equipped with all the latest appliances. Apply to Manager for plans and specifications.

Montreal, Que.

The Columbus Rubber Co., Iberville street, has taken over the Corona Rubber Co. and also secured 26,000 ft. of land adjoining the existing factory and contemplate extensive additions this summer.

The Provincial Bank of Montreal contemplate erection of new bank to replace their present offices.

Plans are being prepared for the erection of a new 6-storey modern departmental store, cor. St. Catherine and Bleury streets.

Plans are ready for erection of offices for Quebec Central Railway. Architect, Cox & Ames, 112 Mansfield st., Montreal. Tenders will be received by architects in about 10 days.

Tenders are called for remodelling Standard Life Bldg., cost $50,000, 157 St. James street. Architects, McVicar & Heriot, 104 Union avenue. Required, new passenger elevators, staircases, marble finish for hallway and minor fittings.

Ottawa, Ont.

The Appleton Wire Co. of Wisconsin, U.S.A., are having plans prepared for a new factory 100 x 42, 3-storey, solid brick construction. Cost about $20,000.

Plans are in preparation for stores and apartments, Gladstone avenue, for M. Levin, Rideau street. Architect, F. C. Sullivan, Queen street. 3-storey, 34 x 90, brick veneer, concrete foundation, tar and gravel roofing, hot water heating, electric lighting.

Porcupine, Ont.

The MacIntyre Mining Co. will enlarge their stamp mill immediately to increase their output, also a Cyanide plant will be required. Washing tables will be required later (Diesters).

Saskatoon, Sask.

The city is contemplating building a public abbatoir, modern equipment required. Cost $100,000.

A. Helgeral is planning to build a two-storey office and store building, modern in every detail, on Third ave. and 21st street, to cost $150,000.

T. A. Blain has had plans prepared for offices and stores, cost $39,000. Architect, D. Webster, Saskatoon. Three storeys and basement, 100 x 80, concrete foundation, brick and stone trimmings, steam heating, electric lighting, pitch and gravel roof, oak flooring, vaults for each set of offices.

Port Arthur, Ont.

The Ontario & Western Car Co. have signed an agreement with the city for 154 acres of land and plan to erect a plant to cost $1,500,000 for the manufacture of railway cars, to be in operation by December 1913. 1000 men will be employed. Among those interested are J. R. McLeod, F. B. McCurdy and F. M. Brown. The company is capitalized at $5,000,000.

Plans are being prepared for extensions to department store to cost $14,000, for J. W. Robinson Co. Ltd, Moose Jaw, Sask. Architect, W. A. Elliott, Brandon. 3-storey, 54 x 125, concrete foundation, brick and cut stone construction, steam heating, electric light, tar and gravel roofing. Floors to be of birch and two passenger elevators.

Sherbrooke, Que.

Plans are prepared for store and office to cost $4,000, on King street, for T. G. Delisle. 3-storey, 30 x 60, stone foundation, brick and stone construction, hot air heating, electric lighting, tar and gravel roofing. Work is being done by day labor.

St. Catharines, Ont.

Excavation is completed for printing office and store, St. Paul street, for Jas. Munroe. The Journal Publishing Co. have leased half the building and will install an up-to-date press. All equipment required.

Tenders are called for erection of a bank building for Sterling Bank of Canada. Architect, John M. Lyle, Toronto. 2-storey, 38 x 45, vaults, brick trim, with Bedford limestone, stone foundation, hot water heating, electric lighting, patent roof. Tenders received by architect.

Tenders are in preparation for stores and apartments for John Widdicomb, real estate agent. New building at 100 and 102 St. Paul street. 3-storey and basement, 46 x 55, steel construction, terra cotta facing, barber shop, office store.

Stratford, Ont.

The Dunford Elk Shoe Co. have purchased the Standard Clothing Company and will remodel building at once. Complete new machinery shop and office fittings will be required.

Toronto, Ont.

Sketches are in progress for garage, cost $2,500, for W. R. P. Parker, 45 Highlands avenue. Architect, C. J. Gibson, 75 Yonge street. Two storeys, brick.

Tenders are open for brick garage for William Harris, 450 Pape avenue. Architect, Henry Simpson, 82 King street east.

Plans are drawn for garage, cost $5,000, on Fermanagh avenue, for E. E. Wheeler, 51 Simpson avenue. Brick, concrete foundation, tar and gravel rfg.

Plans are drawn for addition to drug store to cost $8,000, Bathurst and Olive avenue, for G. D. Reid, 990 Bathurst street. Architect, V. K. Hyslop, 44 Dearbourne avenue. 3-storey, brick.

Walkerville, Ont.

Mayor Walter Chater is erecting a garage here. 1-storey, 12 x 20, gasoline tank in basement.

The Fisher Body Co., 1414 St. Antoine street, Detroit, have selected a site and will erect a factory for manufacture of auto bodies.

Welland, Ont.

The Welland Machinery & Foundry Co. contemplate erecting a new foundry, paint shop, stock room, pattern vault and travelling cranes.

Windsor, Ont.

Jas. Appelbe & Co. will have plans prepared for remodelling a 2-storey brick building into a department store.

Canadian Bank of Commerce are contemplating the purchase of new buildings to be remodelled and fitted with the latest equipment.

Plans are in preparation for factory to cost $35,000, May avenue, for National Body Co. 2-storey and basement, mill construction, 55 x 300, brick foundation, brick walls, mill construction.

Plans are in preparation for remodelling of stores, Pitt street, for Mr. E. R. Dunk. Architects, Crane & Pennington. Complete new store fittings, show cases, shelving, telephones, cash carriers, heating and lighting equipment.

CONTRACTS AWARDED

Brandon, Man.

Plans are ready for business block to cost $70,000, 14th and Princess avenue, for A. E. Bullock. Contractor is owner. Architect, Thomas Sinclair, Brandon. Reinforced concrete construction, stone and red pressed brick, steel tiles, copper block, metal work, electric lighting, steam heating, 28 suites of rooms.

Brantford, Ont.

Addition to factory to cost $4,000, Sydenham street, for The Crown Electric Co. General contractor, Schultz Bros., Brantford. 2-storey, 40 x 70, brick construction, cement foundation, patent roofing.

Calgary, Alta.

Dairy and store to cost $9,000, 3rd avenue west. for P. P. Allison, 603 11th avenue west. General contractor, Luck Bros. & Smyley. 2-storey, 34 x 100, concrete foundation, brick veneer and frame, steam heating, electric lighting, rubberoid roofing.

Plans are ready for addition to warehouse to cost $15,000, for The W. R. Brock Company, 8th avenue west. Architects, Hodson, Bates & Butler, Calgary, Alta. General contractor, G. H. Archibald, Union Bank Bldg. 1-storey, 50 x 130, brick construction.

Plans are ready for business block to cost $190,000, 7th avenue west, for A. C. Johnston, Beverage Block. Architect, A. Pirre, Board of Trade Building. Six-storey, 50 x 130, concrete foundation, steel construction, cement terra cotta, and reinforced concrete, steam heating, and electric lighting, gravel roof. General contractor, McDougall & Foster.

Edmonton, Alta.

Office building, cost $350,000, for The Canadian Pacific Railway. Architect, W. W. Blair, 4 Nanton Block. Seven storeys, 103 x 100, Kahn system reinforced concrete foundation, hydraulic pressed brick and stone construction, terra cotta facings, electric lighting, steam heating, interior finish of marble and ornamental iron, hardwood floors, fire escapes, vaults, ventilating system, telephones, dynamos, motors, electrical work, boilers, engines, factory and mill machinery, passenger elevator. General contractor, C. W. Sharp & Son, 222 McDermot avenue. Interior or decorating to Kettle River Stone Co., Ltd., 403 Travellers Building.

Hamilton, Ont.

Warehouse (addition) to cost $4,500, Market and also Queen Sts. N., for Geo. E. Tuckett & Co. Architect, Stewart & Witton, 2 Hughson street. Contractor, Jno. Tope, 218 Charlton avenue W.

The Hamilton Bridge Works Co. are contemplating a large structural steel extension on East End. Company will do their own work for structural steel. Sheet iron awarded to Jno. Irwin & Co., 17 McNab street south.

Plans are ready for stable and blacksmith shop, cost $8,000, for Walter Roberts, 5 Arkledun avenue. Contractor, Howard & Webber, 231 Mary street. Three storeys and basement, brick and structural steel, basement will be used for stabling horses, first floor for blacksmith shop and upper floor for light manufacturing purposes.

Medicine Hat, Alta.

Warehouse, flour mill and elevator, cost $500,000, for The Ogilvie Flour Mills Co., Ltd., Montreal. Managing Director, F. W. Thompson, Montreal. General contractor, W. A. Black. Tenders will be received at head office, Montreal.

Montreal, Que.

Work has started on store, cost $3,500, St. Dennis street, for J. N. Archambault, 974 St. Dennis. Contractor is owner. Three storeys, 43 x 60, brick construction, gravel roofing.

Foundation has started on [illegible] and residence, cost $3,000, Rosemount ave., for P. Settona, 440 Rosemount ave. Contractor is owner. Three storeys, 25 x 35, concrete foundation, brick and cement, gas lighting, steam heating, gravel roofing.

Work has started on two stores and four dwellings, cost $8,000, Notre Dame street west, for Ephraim Lamy, 557 La Salle Road. Owner ic sontractor. Three storeys, 50 x 57, stone foundation, stone and wood construction, gas and electric light, gravel roofing.

Plans are ready for store and five flats, cost $8,000, Maisonneuve, for H. & A. E. Morine, 217 Ontario street. General contractor, Geo. Marcotte, 141 Ontario street. Three storeys, 50 x 75, concrete foundation, stone construction, electric and gas light, gravel roofing.

Packing house, Montmorenci street, for Canada Sugar Refining Co., Ltd., 150 Montmorenci street. Architect & contractor, E. G. M. Cape, Beardmore Bldg., Montreal. Contract for iron work, Dominion Bridge Co., Lachine. 110 ft. high, 50 x 100, concrete on steel frame, concrete foundation, electric lighting.

Contracts are awarded for shoe factory, De Fleurimont Ave., for A. P. Cimon Shoe Mfg. Co., Ltd., 322 Papineau avenue, Montreal. Architect, C. A. Reeves, St. James street, Montreal. Solid brick, 45 x 150, three storeys and basement. General contractors are proprietors. Carpentering, Z. Gothier & Co., 903 Sanguine street. Brick, T. Guilbeault, 914 Dermoritigny east.

Contract is awarded for remodelling of business block, cost $2,800, on Latour street, for Sawyer Medicine Co., 31 Latour street. Architects, Pedin & McLaren, 20 St. Alexis street. Four stys., 25 x 38, brick construction, concrete foundation, reinforced concrete, steel beams and columns, metal windows, concrete partitions, tar and gravel rfg. General contractor, Robert Nevelle, 26 Latour street.

Port Arthur, Ont.

The Imperial Construction Co. have received contract for the erection of an addition to the Prince Arthur Hotel a large new wing consisting of six stys. and basement and four storeys over the Bank of Nova Scotia comprise the work of extension.

Hotel extension, cost $60,000, for The Canadian Northern Railway, King St., Toronto. Manager, A. J. McLean, Port Arthur. General contractor, Imperial Construction Co., Ltd., Toronto. Four storeys, steel and concrete construction, steam heating, electric lighting, tar and gravel roofing, interior finish oak, telephones in rooms.

Saskatoon, Sask.

[illegible] for The Oddfellows. Architect, W. W. [illegible] basement, pressed brick and stone trimmings, fireproof construction, steam heating, Spencer boiler specified, electric lighting, interior finish of oak and fir, vault doors, tile floors in hall

Stratford, Ont.

Contract is awarded for leather works, cost $164,000, for The Davis Leather Company of Newmarket. Contractor, J. L. Young, who will sublet

Toronto, Ont.

Architects, Redmond & Beggs, are figuring on a ten-storey structure in reinforced concrete, also another in steel and brick construction.

Plans are drawn for store and residence, cost $2,500, S.S. Vankoughmet street, for H. W. Sharp, 1 Adelaide E. Architect, J. G. Hedges, 34 Yonge St. Builder is owner. Brick, stone, tar and gravel roofing.

The following contracts have been awarded to Messrs. Henry Hope & Sons, Toronto: steel casement sash for the H. O. Lee Building, Vancouver. (Messrs. Stroud & Keith, architects); steel casement sash and glass for Copp Clark building, Toronto (Messrs. Wickson & Gregg, architects); steel sash and glass for W. J. Gage building (Messrs. Burke, Horwood & White, architects); steel sash for girder shop for Hamilton Bridge Company; steel sash and glass for Boyd-Brummell building, Toronto (Messrs. Wickson & Gregg, architects).

Winnipeg, Man.

Alterations to hotel, cost $10,000, on Main street, for Albert Vivian. Architect, H. E. Matthews. Contractor, W. H. Smith, 575 Agnes street, Winnipeg.

Printing offices for Farmers Advocate Publishing Co., of Winnipeg, Limited. Architect, A. E. Matthews, Bank of Nova Scotia Bldg., Winnipeg. Brick and stone, steel, concrete foundation, steam heating, electric lighting, tar and gravel roofing, interior finish fir. General contractor, Lyall Mitchell Co., Union Depot, Main street.

Warehouse, on Home street, for J. B. Brown, Garry street. Architect, Ed. Prain, 313 Fort street, Winnipeg. Contractor, Clayton Bros., Winnipeg. 3 storeys and basement, 65 x 100, stone basement, mill construction, concrete foundation, electric lighting, steam heating, prepared roofing, fire escapes, dynamos, motors, etc., boilers and freight elevators.

Power Plants, Electricity and Telephones

St. Mary's, Ont.

The town council has decided to take 1,200 h.p. Niagara power and will require electrical equipment. Superintendent Stapleton has charge of all supplies. Mayor, Mr. Sanderson.

St. Catharines, Ont.

Tenders are called for extension to extension to electrical works, for Canadian Crocker Wheeler Co. Architect, E. D. Pitt, Niagara Falls. Two storeys, [illegible] ment and iron construction, steam heating, electrical lighting, tile roofing, concrete floor. Plumbing and water and drainage system included in contract.

Windsor, Ont.

The Windsor Brass Mfg. Co., W. D Murray, manager, will remodel old [illegible] Ferris property and new equipment will be required.

Winnipeg, Man.

Tenders are called for electrical apparatus, cost $23,000, Bird Hill Gravel [illegible]

(Continued on page 72)

Tenders and For Sale Department

To Architects and Engineers

[illegible] in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and [illegible] in any or all of the "Contract [illegible]

[illegible] and manufacturers read the "Con[illegible]l." It is the logical place to look for [illegible]lled, and where most important works [illegible]

Send along your plans when asking for tenders put a line in your advertisement to that effect. [illegible] tiling plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
[illegible]—Commercial Travellers' Bldg.
[illegible] Pender Street

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

CITY OF MOOSE JAW
SASK.

TENDERS

for Cast Iron Pipe and Specials

Sealed tenders, marked "Tenders for Cast Iron Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, April 15th, 1912**, for the following, delivered F.O.B. cars Moose Jaw:—

10,000 feet of 6-in. pipe, Class C., weight 35.8 lbs. per foot.
5 Reducers, from 8 to 6, Class D.
25 Crosses, 6 x 6 x 6 x 6,Class D.
30 Tees, 6 x 6 x 6, Class D.
10 6-in. Plugs.
2.150 feet of 4-in. pipe, Class A., weight 20 lbs. per foot.
7,000 feet of 12-in. pipe, Class C., weight 91.7 lbs. per foot.
2,200 feet of 10-in. pipe, Class C., weight 70.8 [illegible]
5 Crosses, 12 x 12 x 6 x 6.
3 Tees, 10-in. off 12-in.
10 Tees, 6-in. off 12-in.
1 Reducer from 12-in. to 8-in.
1 Reducer from 8-in. to 6-in.
1 Tee 6-in. off 6-in.
8 12-in. Sleeves.
5 10-in. Sleeves.
5 4-in. Sleeves.

All pipes and specials must conform to the Standard Specifications of the Canadian Society of Civil Engineers.

Tenderers must state time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, March 26th, 1912. 14-15

Notice to Architects

Plans and specifications will be received by the undersigned for the erection of a wing to the General Hospital, Prince Rupert, B. C.

The building to be erected is to cost about $18,000 complete.

Four hundred and fifty dollars will be paid for the plans accepted.

The designs to be sent in by April 30th, 1912.

Blue prints of the present building are on file at the offices of the Contract Record at Toronto, Montreal, Winnipeg and Vancouver.

Prince Rupert General Hospital Association.
14-15

CITY OF REGINA

Water Collecting Pipe Lines, Etc.

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon on **Friday, April 12th, 1912**, for the excavation of about three miles of trenching for and the laying therein of 6-inch to 15-inch vitrified pipes, construction of manholes, etc., for water collecting lines at the source of supply in the Boggy Creek Watershed near Regina.

The City reserves the right to reject any or all bids and to waive any irregularities therein.

Tenders for the whole or any part of the above work will be considered.

Accepted cheque for $2,000 must be deposited with each tender, or a proportionate cheque in case approximately 5 per cent. tender when only part of the works is tendered for.

Copies of plans, specifications, schedules and forms of tenders and full information may be had from the undersigned.

R. O. WYNNE ROBERTS,
Consulting Engineer,
P. O. Box 65, Regina, Sask.

City Hall,
March 23rd, 1912. 14 15

THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA.

To Canadian Architects

Competition for New University Buildings to be erected at Point Grey, near Vancouver, British Columbia

The Government of British Columbia invite Competitive Plans for the general scheme and design for the proposed new University, together with more detailed Plans for the buildings to be erected first at an estimated cost of $1,500,000.

Prizes of $10,000 will be given for the most successful Designs submitted.

Particulars of the competition and plan of site may be obtained on request from the undersigned.

The designs to be sent in by July 31st, 1912, addressed to

THE MINISTER OF EDUCATION,
Parliament Buildings,
10-15 Victoria, British Columbia.

Machinery For Sale

1—70-ton Style C Bucyrus Shovel.
4—18-ton Porter Dinkies, 36-in. gauge.
1—12-ton Porter Dinkie, 36-in. gauge.
50—4 cu. yd. two-way Dump Cars.
1—80 h.p. Boiler on Skids.
1—30 h.p. Maruir Type Boiler.
1—Air Compressor and Tank.
80—G. T. 56 lb. Relaying Rails.

All in first class order for immediate shipment.

FRASER, BRACE & COMPANY,
P. O. Box 121,
12-15 Valleyfield, P. Q.

CITY OF MOOSE JAW
SASK.

Tenders for Sewer Pipe and Specials

Sealed tenders, marked "Tenders for Sewer Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to noon of **Monday, April 15th, 1912**, for the delivery of the following, F.O.B. cars Moose Jaw:

20,000 feet of 8-in. pipe.
20 Tee-y's, 6-in. off 10-inch.
800 Tee-y's, 6-inch off 8-inch.
250 8-inch channels.
5 Tees, 10-inch off 10-inch.

Tenderers must time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, March 26, 1912. 14-15

Canadian Pacific Railway Company

Department of Natural Resources

Tenders for Concrete Construction

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Concrete Structures," will be received up to noon of **May 1st, 1912**. The work to be let includes the concrete structures in about half of the area comprising the Eastern Section of the Company's Irrigation Block, Alberta. Materials, except for forms, will be furnished by the Company. Materials for forms and all labor must be furnished by the Contractor. The approximate quantities are: 15,000 cubic yards of concrete and 1,200,000 pounds of reinforcing steel. The quantities in individual structures vary from 5 cubic yards to 700 cubic yards.

Plans, specifications and full information will be furnished after April 1st, 1912, on application to the undersigned. A deposit of $100 will be required before plans, etc., will be given out, which will be refunded on their return in good condition.

All proposals must be accompanied by a certified cheque, payable to the undersigned, for five per cent. of the amount of the tender, to be forfeited as liquidated damages should the bidder neglect or refuse to enter into a contract in the event that the work is awarded to him.

Proposals must be made on the standard form provided. Alterations thereto, interlineations or qualification of prices may invalidate the bid.

The right is reserved to reject any or all bids and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., March 20, 1912. 13-15

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 373, Winnipeg. 11-23

CITY OF STRATFORD

Tenders will be received until 5 p.m., **April 22nd, 1912**, for approximately 32,000 square yards of pavements. Specifications and particulars may be had on application. Lowest or any tender not necessarily accepted.

M. FERGUSON,
City Engineer.
15-16

NOTICE

The undersigned are prepared to grant licenses at a reasonable price to anyone desiring to use the method of laying conduits described and claimed in Cahn and Seeberger's Canadian Patents 124,562 and 124,563, dated March 22nd, 1910. They are also prepared to receive offers for the purchase of the patents or for licenses to manufacture the machinery required to practice said processes. Ridout & Maybee, Manning Chambers, Toronto, attorneys for the patentees. 15

Tenders for Bridge Construction

Tenders will be received at the office of the undersigned up to twelve o'clock noon on **Tuesday, April 23rd, 1912**, for the construction of Concrete Abutments and Concrete Floors for the following bridges:

1. Malton Bridge, over the Mimico Creek on the town line between the Counties of York and Peel near the village of Malton, for the Counties of York and Peel.
2. North Woodbridge Bridge, over the Humber River, on the County Road in the Township of Vaughan near the Village of Woodbridge, for the County of York.
3. Cockburn's Bridge, over the Humber River on the road between lots 15 and 16 Con 7, in the Township of Vaughan, in the County of York, for the Township of Vaughan.

Plans and Specifications may be seen and all information may be obtained at the office of the undersigned, 57 Adelaide street east, Toronto.

FRANK BARBER,
Civil Engineer.
Toronto, March 22, 1912. 15-16

CITY OF EDMONTON

Tender for Tunnel Sewer

Sealed tenders will be received by the undersigned up to 6 o'clock **April 30th, 1912**, for the construction of a Reinforced Concrete Tunnel Sewer.

Envelopes containing tender must be marked "Tender for Tunnel Sewer."

Specifications and forms of tender may be obtained at the office of the City Engineer, Edmonton.

Specifications may also be seen at the office of the Contract Record and Canadian Engineer.

A deposit of ten ($10.00) dollars will be required for each set of specifications and plans.

All tenders must be accompanied by a certified cheque for one per cent. (1 p.c.) of the value of the contract.

The right is reserved to accept or reject any or all tenders.

CITY COMMISSIONERS,
Edmonton, Alta., March 23, 1912. 14-16

Superintendent of Light and Power Department Wanted

Applications will be received by the undersigned on behalf of the City of Fernie, B.C., up to the **22nd** day April, 1912, for the position of Superintendent of Light and Power Department. Applicants to state experience, qualifications and salary required. Duties to commence May 1st, 1912. Reply,

S. W. BARCLAY, City Clerk,
Fernie, B. C.
15-16

CITY OF CHATHAM

Tenders for Pavements

Sealed tenders addressed to W. G. Merritt, City Clerk, Chatham, Ont., will be received until 3 p.m., **Monday, April 15th, 1912**, for the construction of about 6,300 square yards of permanent pavement and about 6,200 lineal feet of concrete curb and gutter.

Tenders are asked for,—

(a) Concrete foundation for the above pavement with combined curb and gutter.

(b) Wearing surface of Vitrified Paving Brick, Bitulithic, Tarilithic or Asphalt Block.

(c) Complete concrete pavement, including curb and gutter.

Specifications may be seen and forms of tender obtained from the office of the City Engineer.

The lowest or any tender not necessarily accepted.

C. E. LISTER,
Chairman, Board of Works.
F. P. ADAMS,
City Engineer.
15

CITY OF REGINA

Province of Saskatchewan

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon on **Thursday, April 18th, 1912**, for the supply of:

2,722	lin. ft.	of 60-in. Rein. Con. Sewer Pipe.
1,697	lin. ft.	of 54-in. Rein. Con. Sewer Pipe.
4,419	lin. ft.	of 24-in. Rein. Con. Sewer Pipe.
7,272	lin. ft.	of 45-in. Rein. Con. Sewer Pipe.
3,155	lin. ft.	of 42-in. Rein. Con. Sewer Pipe.
2,777	lin. ft.	of 40-in. Rein. Con. Sewer Pipe.

Tenders for the whole or any part of the above pipe will be considered.

The City reserves the right to reject any or all bids, and to waive any irregularities therein.

Copies of Plans, Specifications, Schedules and Form of Tender and full information may be had from the undersigned.

J. M. MACKAY,
Chief Engineer, Trunk Sewer Works.
Regina, Sask.
April 4th, 1912.

Moose Jaw Public Library Board

TENDERS

Sealed tenders addressed to the undersigned will be received up to 4 p.m. on **Wednesday, April 24th, 1912**, for the erection of a Public Library Building in Crescent Park in the City of Moose Jaw.

A marked cheque for five per cent. (5 p.c.) of the amount of the tender must accompany each bid.

Plans and specifications and all information [illegible] Architects, Howden Block, Moose Jaw.

The lowest or any tender not necessarily accepted.

W. F. HEAL,
Secretary Public Library Board.
Moose Jaw, March 28, 1912. 15-16

To Contractors

Tenders will be received at the office of Symons & Rae until 12 o'clock noon on Monday, **April 22nd**, for all trades required in the erection of St. Alban's Cathedral, Toronto. Drawings, specifications and other information may be obtained at the office of

SYMONS & RAE,
Superintending Architects,
15 Toronto Street, Toronto.

No tender will be necessarily accepted.

CRAM, GOODHUE & FERGUSON,
Architects,
14-15 Boston and New York.

City of London, Ontario

Board of Water Commissioners

Specifications and forms of tender for the following material may be obtained on application:

100	tons	18-in. cast iron pipe.
450	tons	12-in. cast iron pipe.
25	tons	10-in. cast iron pipe.
5	tons	8-in. cast iron pipe.
65	tons	4-in. to 6-in. cast iron pipe.
35	tons	special castings of various tpyes and sizes.

H. J. GLAUBITZ,
General Manager.
London, Ont.
14-15

CITY OF TORONTO

TENDERS for Concrete Mixer

Tenders on prescribed forms will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, April 23rd, 1912**, for the supply of one concrete batch mixer of not less than fourteen (14) cubic feet capacity loose material, to be mounted on street railway trucks of four (4 ft.) feet ten and seven eighth (10⅞-in.) inch gauge.

Specifications and form of tender may be obtained on application to the Department of Railways & Bridges, City Engineer's Office, Toronto.

Envelopes containing tenders must be plainly marked on the outside, "Tender for Concrete Mixer."

Tenderers shall submit with their tenders, the names of two sureties approved of by the City Engineer, or in lieu of said sureties the bond of a guarantee company, approved as aforesaid.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman of the Board of Control.
City Hall, Toronto,
April [illegible], 1912. 15

CITY OF SASKATOON

Tenders for Concrete Sewer Pipe

Sealed tenders, addressed to the City Com[illegible] Sewer Pipe," will be received up to twelve o'clock noon on **Friday, April 19th, 1912**, for the [illegible] to 24 in., and the necessary Y's, Tees, etc.

[illegible] Engineer, Saskatoon.

[illegible]
[illegible]
[illegible] 14-15
Saskatoon, March 27, 1912.

Parsons Trench Excavator For Sale

[illegible]

J. H. McKnight Construction Company, Ltd.,
[illegible]

CITY OF TORONTO

Main Drainage Works

Sealed tenders, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of Tuesday, April 23rd, 1912, for the construction [illegible] of 3,890 lineal feet, and the latter 2,930 lineal feet of 4 foot 6 inch diameter circular brick [illegible]

Plans, specifications, form of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
[illegible] Board of Control

TOWN OF HIGH RIVER
PROVINCE OF ALBERTA

Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on **Tuesday, April 30th, 1912**, for the following works:—

Contract "A"—Labor laying Water Mains and Sewers.
Contract "C"—Furnishing materials for and Erecting Water Tower.
Contract "D"—Furnishing Cast Iron Water Pipes and Special Castings.
Contract "E"—Furnishing Fire Hydrants, Gate Valves, Etc.
Contract "O"—Labor on Main Outfall Sewer.
Contract "S"—Furnishing Sewer Pipes and Junctions.
Contract "W"—Furnishing 4,500 feet of 12-inch Wooden Pipe.

Tenders will shortly be called for Power House, Machinery, and Sewage Disposal Works.

Plans and Specifications may be seen at the office of the Engineers, Toronto and Winnipeg, and at the Town Hall, High River, on and after April 8th, 1912.

The lowest or any tender not necessarily accepted.

For further information apply to the undersigned.

R. A. WALLACE, Esq., Mayor.
GEO. E. MACK, Esq., Secretary-Treas.,
CHIPMAN & POWER, Engineers.
14-15

Situations Vacant

Advertisements under this heading two cents a word per insertion. Box No. ten cents extra. Minimum charge 25 cents

[illegible] Draughtsman of five or six years' experience, steady work to right men, when applying state age, experience, and salary. Address Box 472, Contract Record,
14-15

Inspector Municipal Waterworks and Fire Appliances required by the Canadian Fire Underwriters' Association. Applicants must be qualified by knowledge of Hydraulic, Steam and Electric Power Engineering. Applications should be addressed to the Secretary, C.F.U.A., Coristine Building, Montreal, Que., and to receive attention must give details of present and past employment, age and salary expected. 14-15

PLANT FOR SALE

Little Giant Special Steam Shovel, 1¼ Yard Dipper. Also Large Size Steam Pile Hammer.
The Randolph Macdonald Company, Limited,
14-15 Toronto, Ont.

CITY OF REGINA
SASKATCHEWAN

Sealed tenders for the following apparatus and supplies will be received by the City Commissioners, City of Regina, up until noon of the **20th of April, 1912**, for sections 1 to 5, and up until noon of **May 15th, 1912**, on sections 6 to 9.

Section 1.—Poles, cross arms, side brackets, top pins.
Section 2.—Pole line hardware.
Section 3.—Copper wire.
Section 4.—Transformers.
Section 5.—Meters.
Section 6.—Luminous arc, street lighting equipment.
Section 7.—Street lighting poles, metal.
Section 8.—Draught fan.
Section 9.—400 kw. d.c. generating unit.

Tenders will be received for the whole or any section of this work.

The lowest or any tender not necessarily accepted. The City reserves the right to waive any irregularities in any tender.

Specifications for any or all of these sections may be had on application to the

CITY ELECTRICIAN,
5 Regina, Sask.

CITY OF EDMONTON

Tenders for Nelson Ave. Trunk Sewer

Sealed tenders will be received by the undersigned up to 6 o'clock, **April 30th, 1912**, for the construction of a Reinforced Concrete Sewer.

Envelopes containing tenders must be marked "Tender for Trunk Sewer."

Specifications and forms of tender may be obtained at the office of the City Engineer, Edmonton.

Specifications may also be seen at the Toronto offices of the Contract Record and Engineering Review, and Canadian Engineer.

A deposit of ten ($10) dollars will be required for each set of specifications and plans.

All tenders must be accompanied by a certified cheque for one per cent (1 p.c.) of the value of the contract.

The right is reserved to accept or reject any or all tenders.

CITY COMMISSIONERS,
Office of the City Engineer,
Edmonton, Alta., April 2, 1912. 15-17

Power Plants, Electricity and Telephones

(Continued from page 69)

street, Winnipeg. Specifications may be seen at Engineer's office. Tenders received by Board of Control until April 11, 1912.

13,000 volt line	$7,000
Electric locomotive	5,000
Trolley line	2,000
Electrical shovel	9,000

Miscellaneous

Eastview, Ont.

The Village Council has passed a by-law for the purchase of two chemical fire engines.

Saskatoon, Sask.

Contract is awarded for police and fire signal system, cost $11,165, to British Canadian Insulated Co., of Montreal.

New Companies

The Wilkie Realty and Development Company, Limited, has been incorporated with a capital of $40,000, to erect buildings and deal in building material, with head office at Toronto. The provisional directors are R. F. Kirby, J. G. Moore and A. W. Moore, of Walkerton, Ont., and A. W. Moore, of Wilkie, Sask.

The Raymond Cement Products Co., Ltd., has been incorporated with a capital stock of $100,000, to erect railways, bridges, reservoirs, warehouses, electric works, etc., with head office at Montreal, Que. The incorporators are P. Turgeon, Chas. Raymond, and J. B. Archambault, all of Montreal.

The Universal Electric Economy Co., Ltd., has been incorporated with a capital stock of $50,000, to carry on business as electrical engineers, contractors, dealers in railway, electrical, magnetic and other apparatus, etc., with head office at Montreal, the incorporators are C. V. Cousins, A. H. Elder and S. T. Mains, of Montreal.

Fortier & Kilpatrick, Limited, have been incorporated with a capital stock of $250,000, to manufacture and deal in lumber, timber and other forest products, asphalt and all builders' supplies, and carry on business as contractors, with head office at Toronto, Ont. The incorporators are J. H. Spence, Grant Cooper and R. P. Locke, all of Toronto.

The International Home Building Co., Ltd., has been incorporated with a capital of $200,000, to erect buildings and deal in all kinds of building materials, with head office at Toronto, Ont., the incorporators are A. C. Goulding, J. A. Lundy and J. J. Cook, of Toronto.

Keewatin and Western Construction Co., Ltd., have been incorporated with a capital of $100,000, to carry on business as engineers and general contractors, with head office at Winnipeg, Man. The incorporators are J. C. Kyle, D. S. Johnston and Harley Henry, all of Winnipeg.

Metropolitan Realty Company, Ltd., has been incorporated with a capital of $40,000, to deal in all kinds of building materials, the head office is at Toronto and the provisional directors are A. W. Holmested, W. L. Carr and C. J. F. Collier, all of Toronto.

Business Notes

Morden, Man.

The elevator mills of Ogilvie Elevator & Flour Mills were completely gutted by fire on March 30th, also pool rooms and bowling alley in the next store. Will be re-built as soon as possible.

Ottawa, Ont.

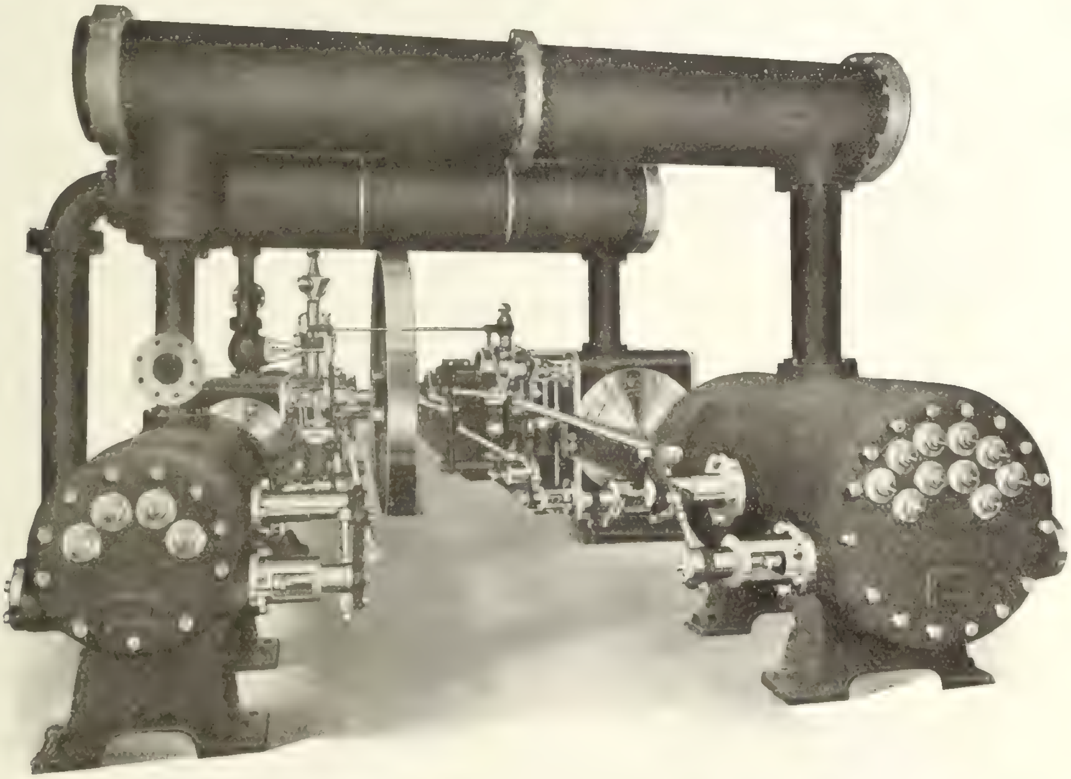
Ottawa Paint Works, 687 Wellington street, were destroyed by fire March 28. Estimated loss to stock and building about $8,000. Will re-build as soon as possible.

Petrolia, Ont.

The oil pumping rigs of Messrs. Armstrong & Morris were completely destroyed by fire. New equipment will be purchased at once.

AIR COMPRESSORS

Quality - Prompt Delivery - Right Prices



Air Compressor built for National Transcontinental Railway, Winnipeg, Man.

Boilers, Engines, Penstocks, Water Towers, Steel Tanks
Heavy Plate Work, Condensers, Air Compressors,
Pumping Machinery

Let our representative tell you about "INGLIS" PRODUCTS.

The JOHN INGLIS COMPANY Limited

Engineers and Boiler Makers

14 Strachan Avenue - - TORONTO, Canada

Wooden Water Pipe

**Galvanized Wire Wound and Continuous Stave Pipe
for Water Works, Power, Irrigation, etc.**

Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquiries.

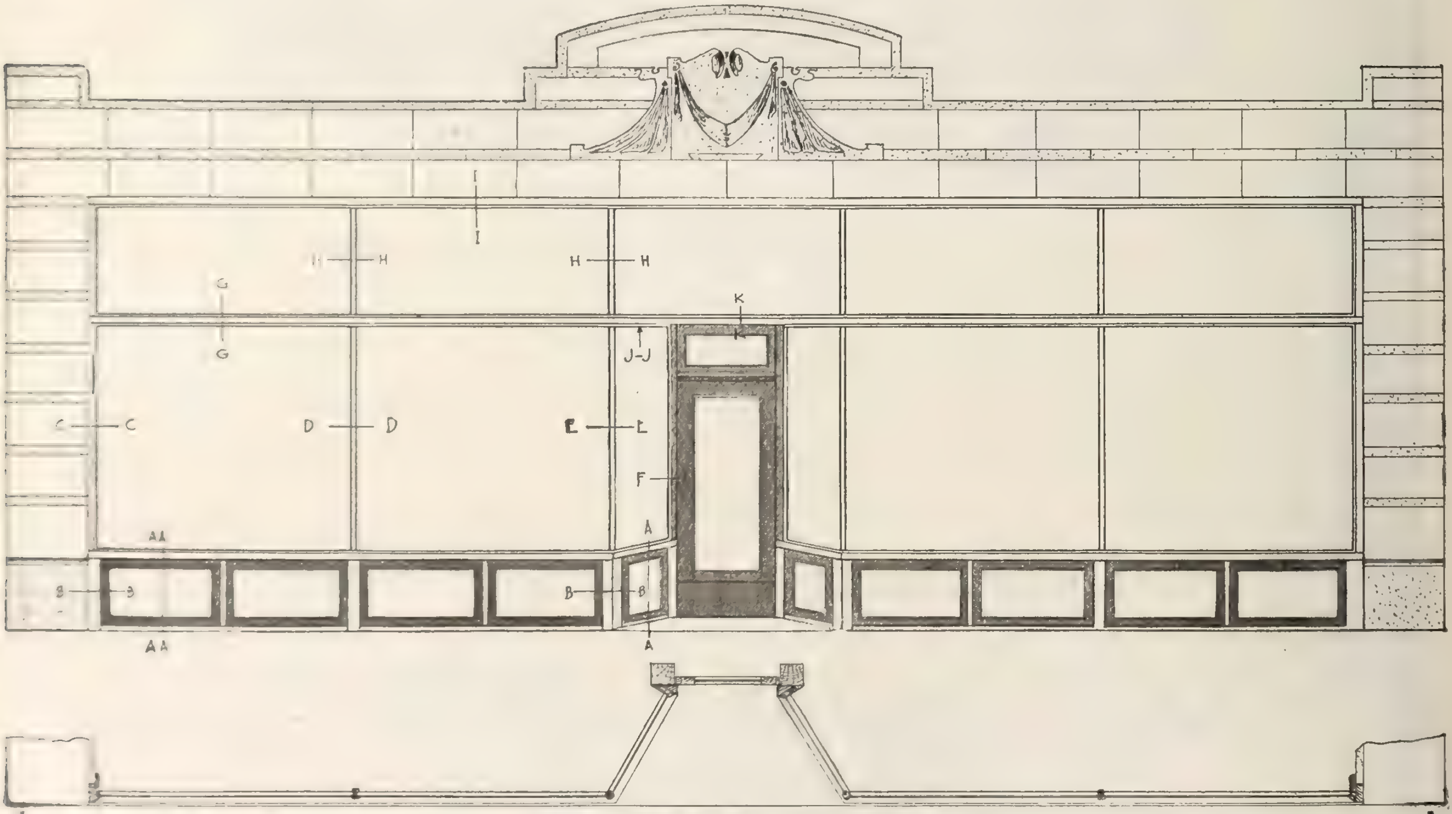
Write for prices.

Manufactured by

Canadian Pipe Co., Limited

P.O. BOX 915

Factory: 550 Pacific St., VANCOUVER, B.C.



THE HESTER SYSTEM

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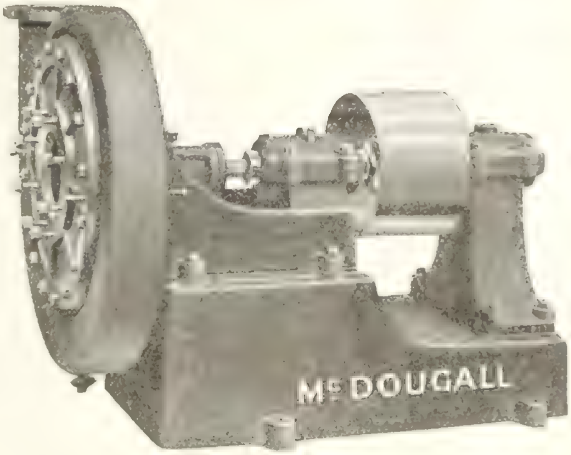

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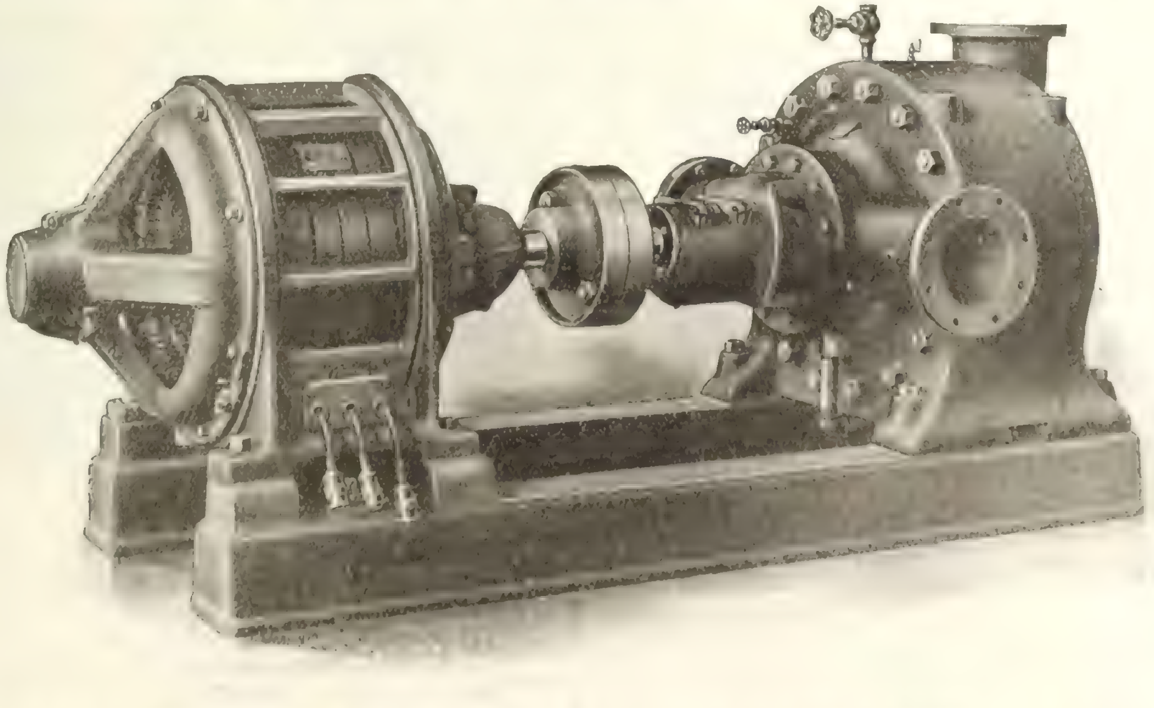

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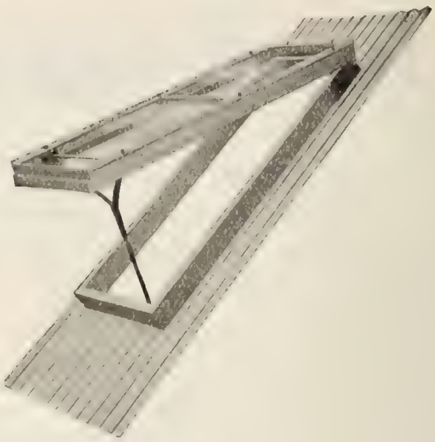

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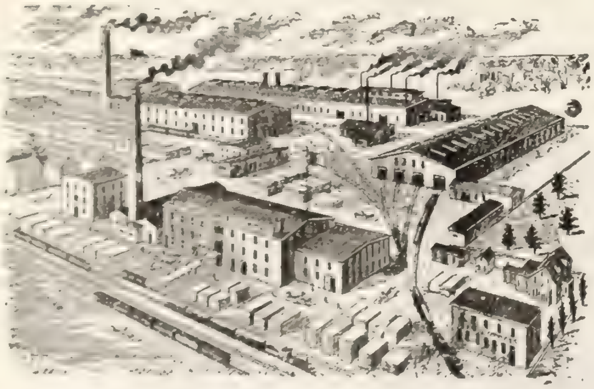

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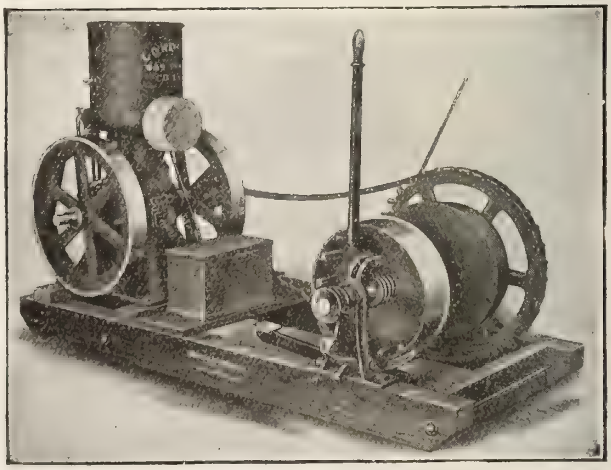

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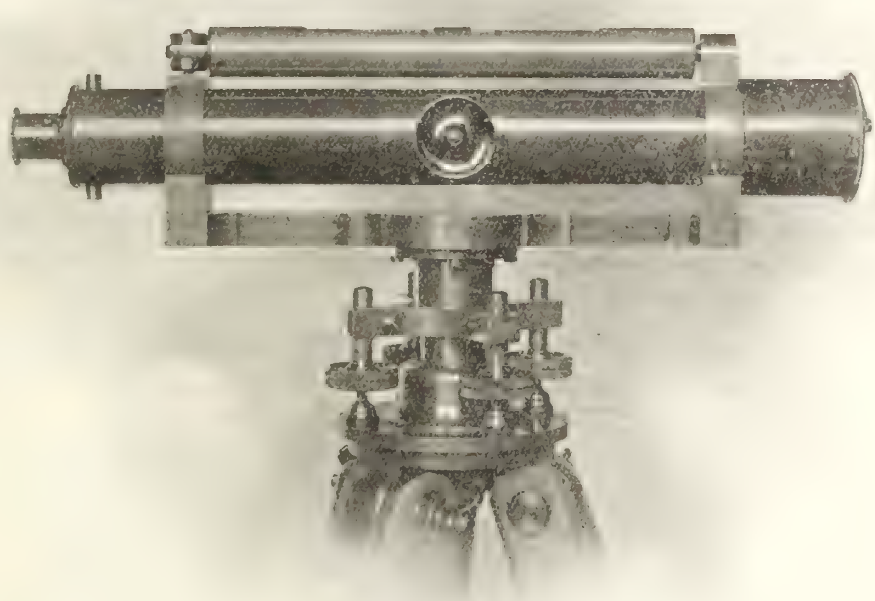

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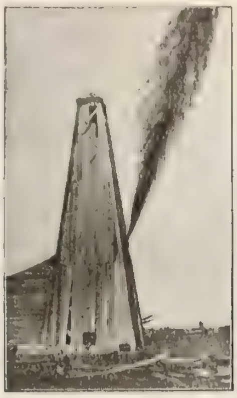

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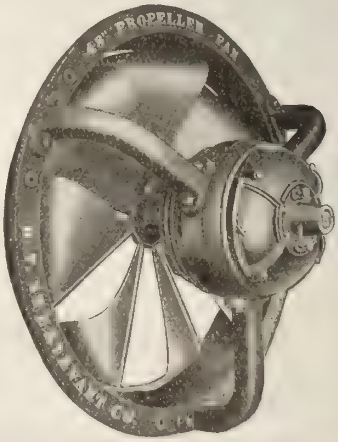

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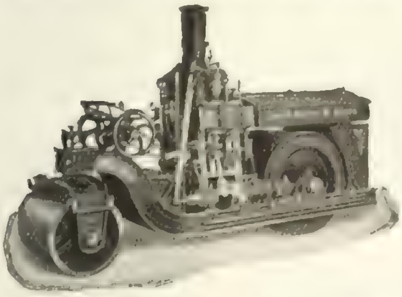

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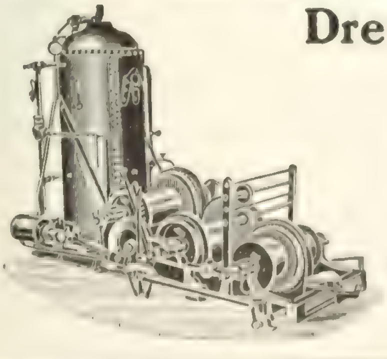

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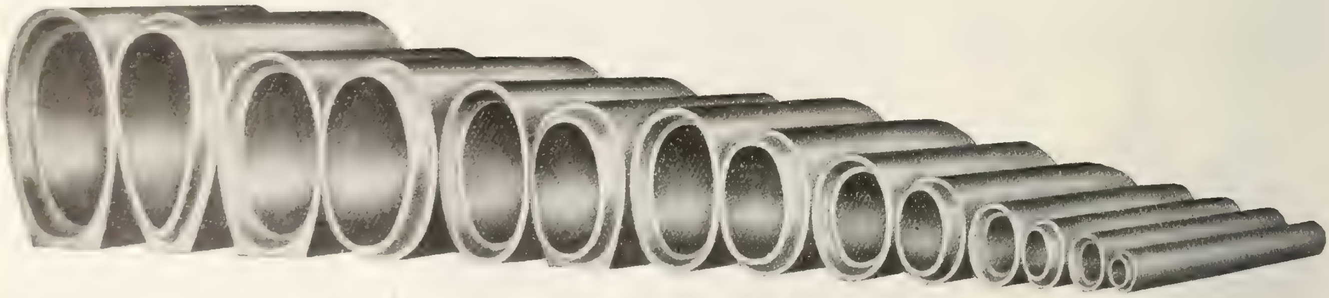

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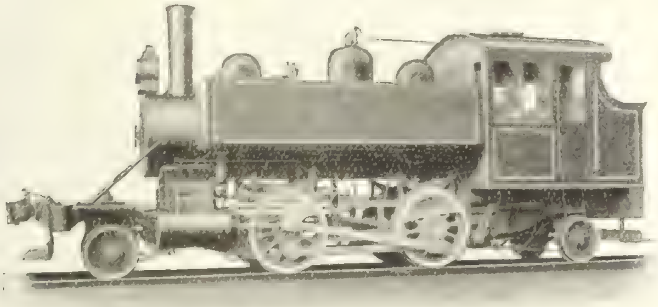

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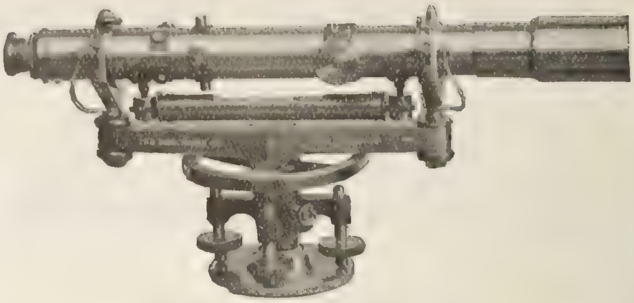

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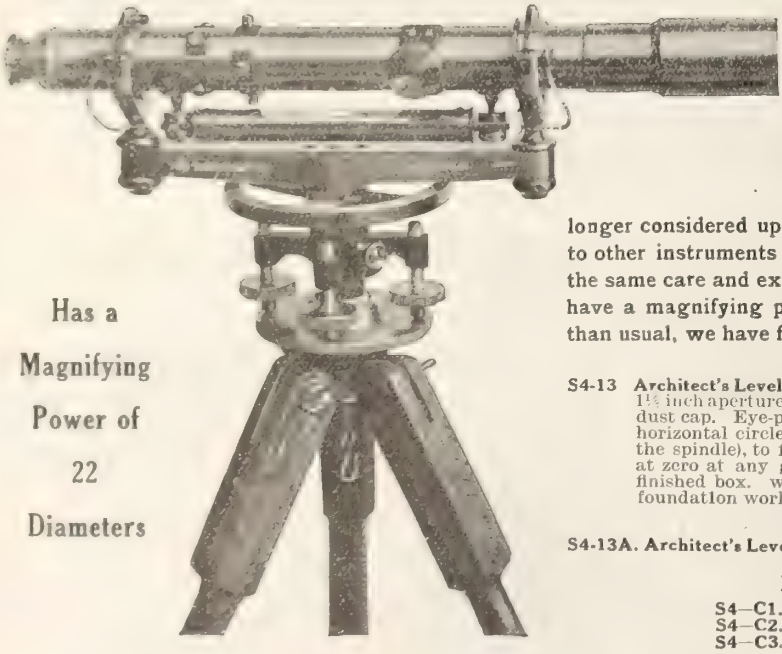

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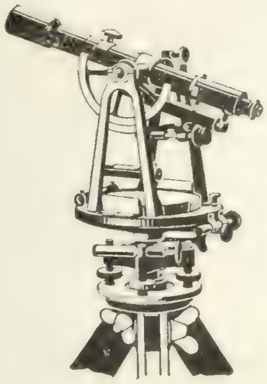

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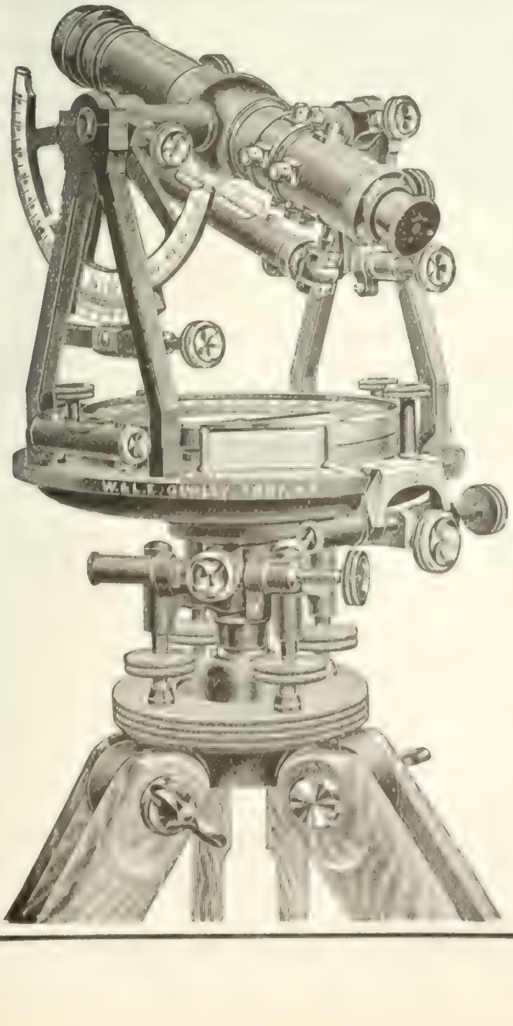

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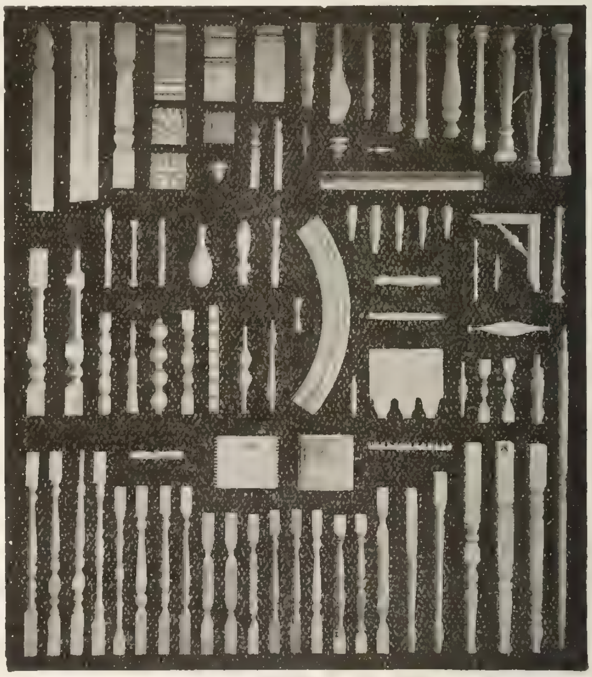

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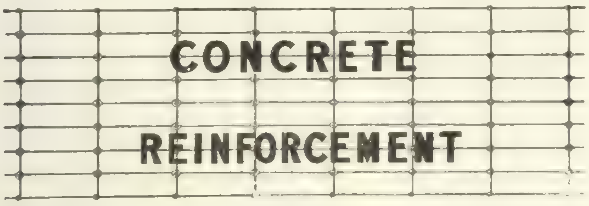

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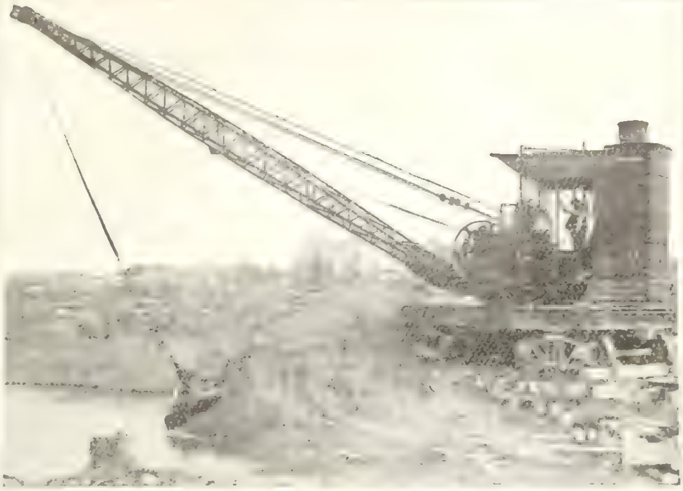

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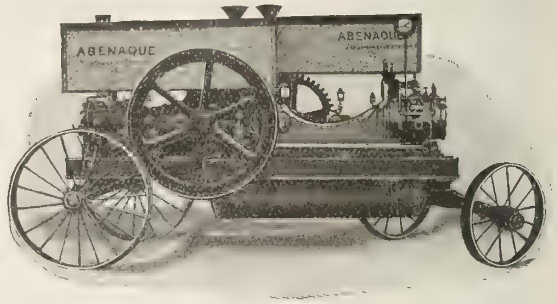

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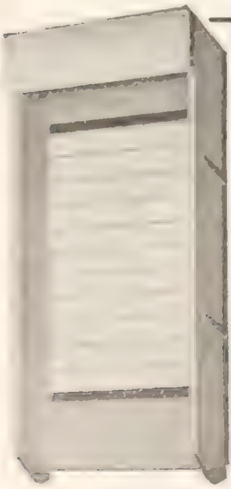

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Builders and Contractors' Supplies

Portland Cement, Lafarge Cement, Gravel, Sand, Rubble, Imported and Canadian Pressed Brick for front work and fireplaces.
CRUSHED STONE—Dimension and Coursing Stone, Lime
FIRE BRICK   **IVORY CEMENT PLASTER**

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The Contractors' Supply Co., Limited
Manning Chambers, Toronto   Tel. M. 6859

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$2.65	$4.05
40	2.85	4.50
50	3.25	4.81
60	3.45	5.50
70	3.75	6.32
80	4.25	6.87
85	4.70	7.70
90		9.07
96		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock .... net $1.75

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5¼ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $7 per 100 lbs. per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 95c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 92c. per gallon of 9 lbs.

Turpentine, in barrels, 69c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Orillia, Ont.

J. R. Eaton & Sons, sash and door factory and machinery were destroyed by fire; loss about $75,000; well insured. They will rebuild.

Regina, Sask.

Fire destroyed the men's quarters, chapel and two houses of the North-West Mounted Police. Loss $20,000.

Toronto, Ont.

Fire completely destroyed Toronto Street Railway Company's King street car barns and about 250 cars. Loss about $400,000. The company will rebuild barns and cars immediately.

Trout Brook, Que.

Saw and planing mills of Mederic Pepin burnt on 16th inst., value $3,000; he will rebuild as soon as possible. Mill machinery will be required.

Warwick, Que.

Dominion Comb & Novelty Company's building has been completely destroyed by fire. The factory will be

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

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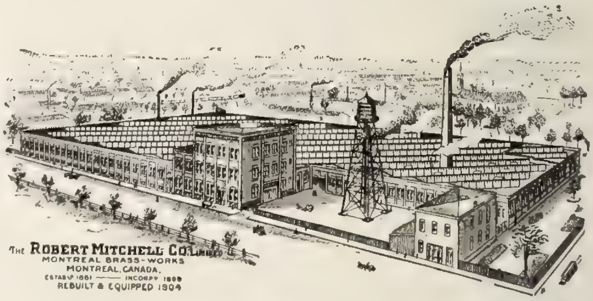

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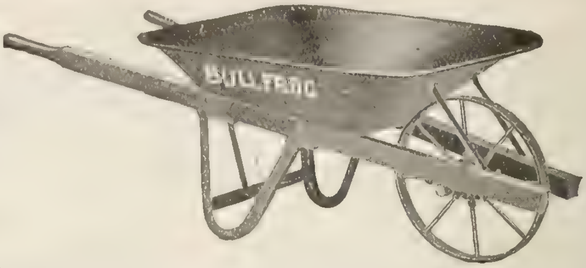

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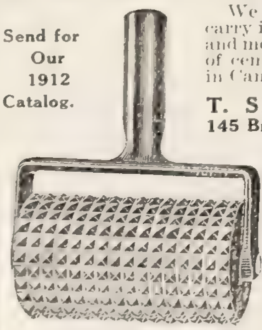

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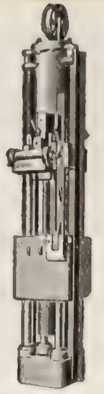

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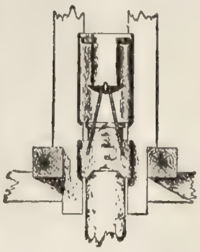

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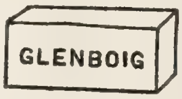

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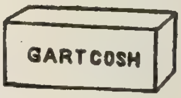

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1—26 ton Little Giant Traction Shovel.
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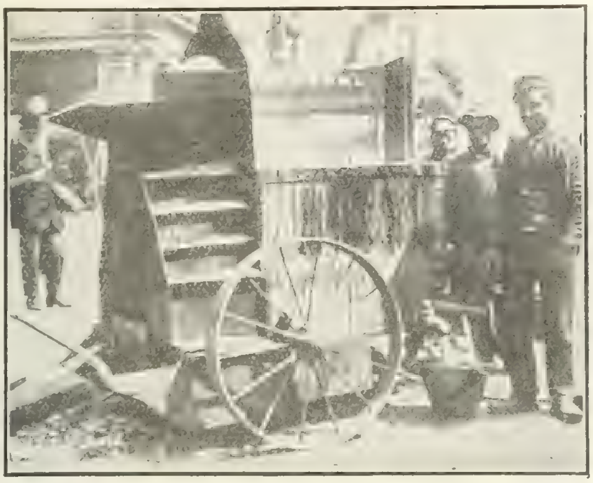

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- Soot Doors
- Hard Wall Plaster
- Sackett's Plaster Board
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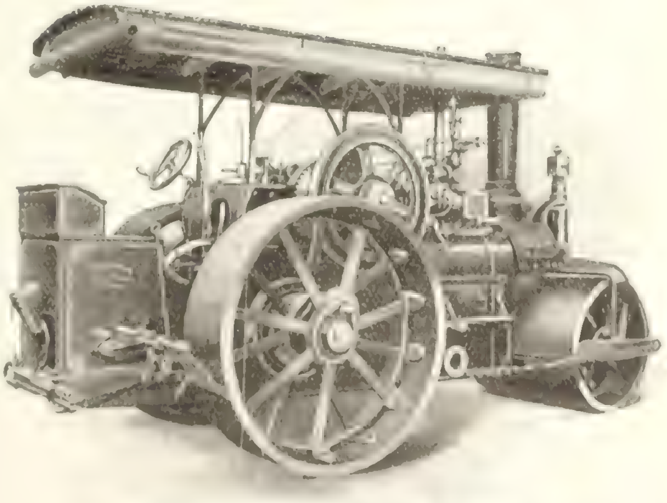
Waterous Double Cylinder Rollers can be used on any kind of road work. Over 130 have been sold in Canada. They have made good wherever used.

The Waterous Roller is built in 10, 12 and 15 ton sizes which can be supplied from stock.
Its special features in which it differs from other rollers on the Canadian market are:— Double Cylinder, Double Crank Engine, high pressure, locomotive type boiler; rocking grates; dumping ashpan; two speed forward and reverse motion with all gears cut from solid steel.

It is further provided with Universal Joint steel yoke, wear proof rolls, improved spring roll scrapers, has attachments for driving rock crusher and has front clevice and rear draw bar for hauling plow or road material.



Fully described in bulletin No. [illegible]

When you see a Waterous Roller at work, ask the man in charge what he thinks of the machine.

The Waterous Engine Works Co., Limited

Brantford, Canada

[illegible] weight on this floor. Entire building of Alsen's Cement reinforced concrete

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

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behind radiators. Steam will warp wood lath and crack the plaster.

Why Herringbone?

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There are seven other reasons equally good.

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General Sales Agent
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Metal Shingle and Siding Co., Manufacturers

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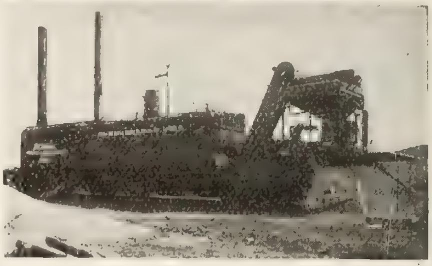
The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.



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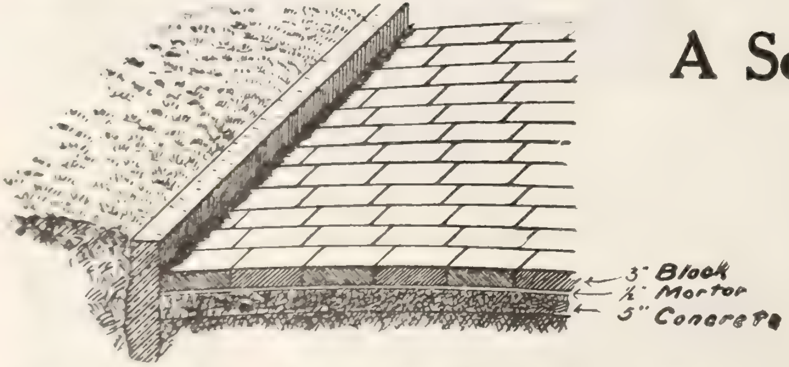

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Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

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Positively the best all round Horse Liniment made.

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A sure and speedy cure for all kinds of Colic

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Have you ever used for your men

Johnson's Mosquito Oil 1.75 doz., 18.00 per gross

It positively does the trick

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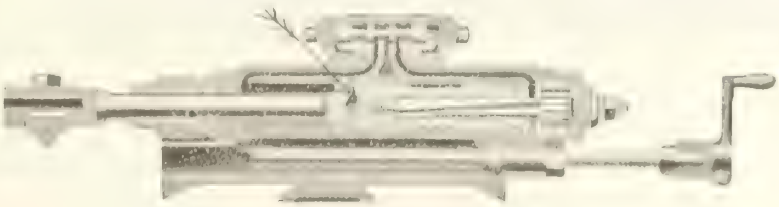
Don't allow traditions, and a stock of spare parts of obselete drills to keep you from using progressive methods and up to the minute tools.

The McKiernan-Terry "Wizard" rock Drill is the last word in a piston rock drilling machine.

It has an air cushioning device on the end of the rifle bar.



It was found by exhaustive tests that a drill equipped with this device would use 25% less compressed air, and strike about 50% more blows per minute.

This cushioning device is a basic principle, patented.

Wizard Rock Drills are built to run. Don't be mentally lazy. Order one now, any size.

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Column and Girder Covering
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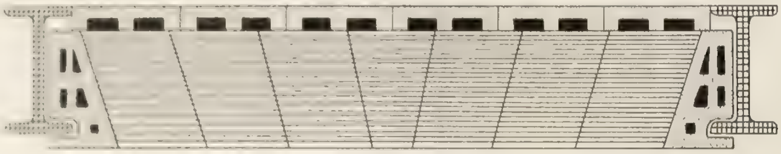

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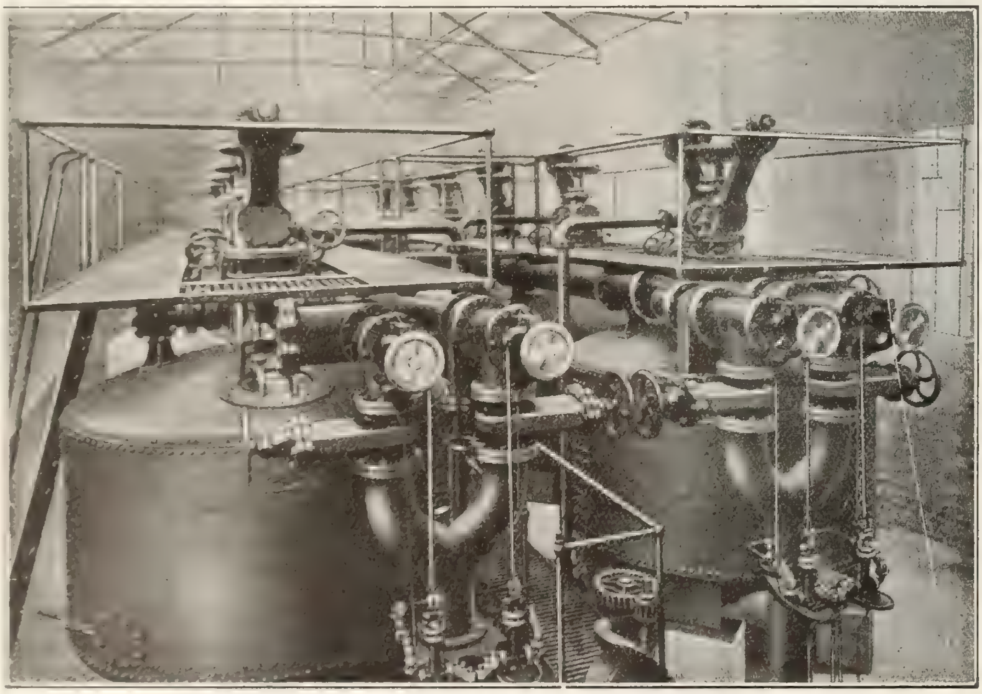

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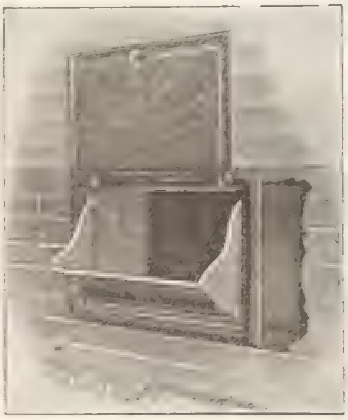

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with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

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The Blystone Hand Truck Mixer

has been acknowledged to meet every requirement. On sidewalks and foundation work this mixer can be moved around and operated without the slightest trouble or effort.

Strong in construction and simple and compact in design, it does its work effectively without causing loss of time through operation or trouble with repairs.

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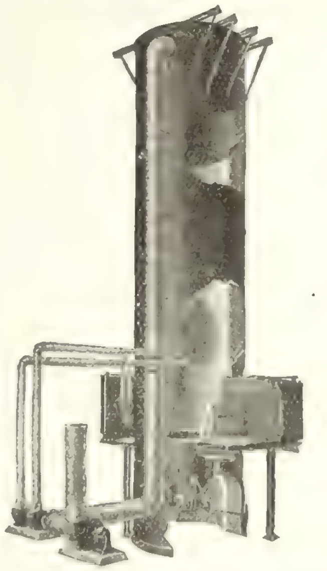

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To this end we embody in them the best design, the finest construction and the highest grade materials, all merged by our experience in combustion problems into a high-class, money-making, lime-producing apparatus.

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Be Prepared

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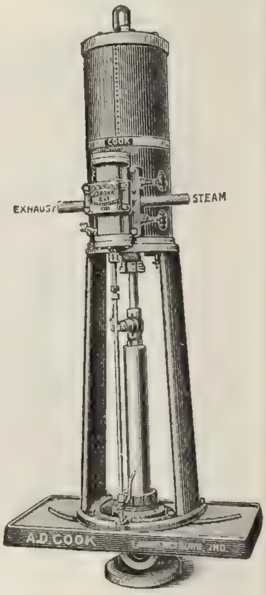

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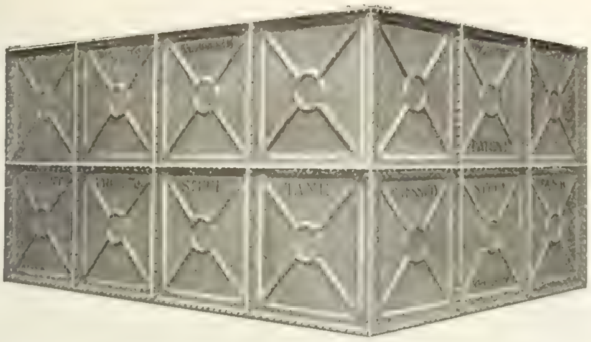

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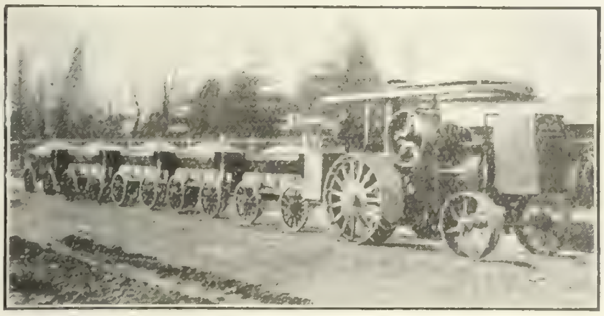

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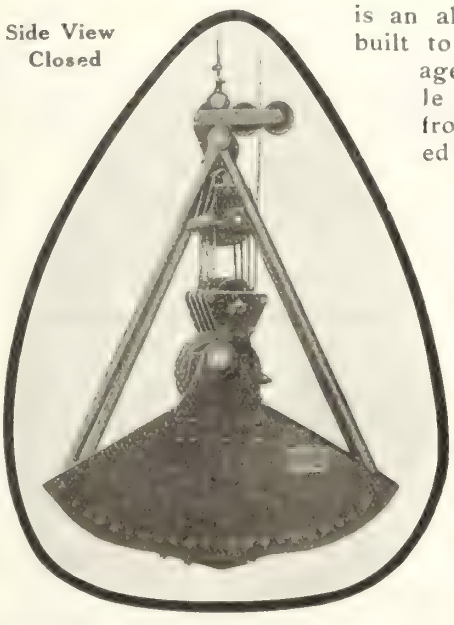

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The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

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We make valves and hydrants for every branch of municipal waterworks, and for heating systems.

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The Vulcan Gas Ranges and Water Heaters

installed. They keep a house or apartment in a much cleaner and healthier condition. Once installed there is no danger of damaged walls and staircases through careless carrying in and out of tenant's own appliances. The Vulcan goods are also made strong. Parts can be replaced easily. The Gas Company cleans the burners once every three months without extra charge (Toronto homes only). This promotes lasting satisfaction. Tenants remain, because of the increased accommodation. Let us have a talk on the matter. We can supply interesting particulars. We are at your service. Remember also, that we inspect Toronto piping contracts for you free of charge, to ensure efficiency. Act to-day. Consulation free. Prices right. Terms easy.

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They represent the Vulcan's efficiency.

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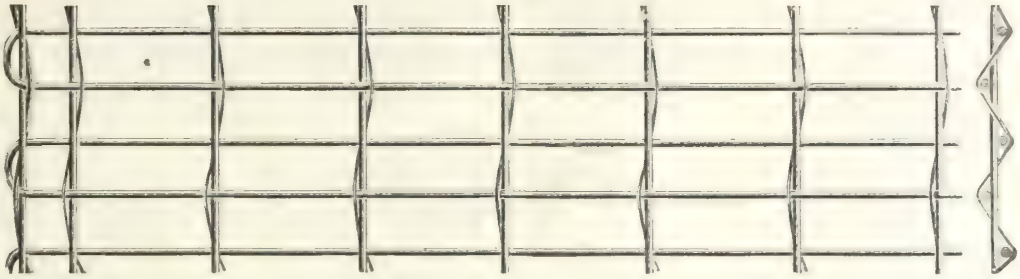

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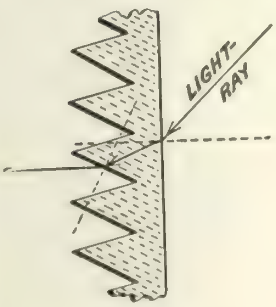
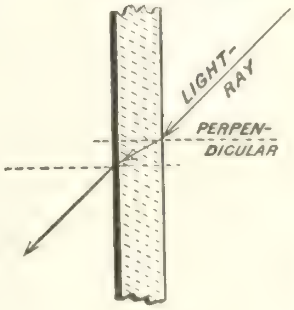


Daylight Where You Need It



Every building needs all the daylight you can possibly get into it. Luxfer is the only system for Daylighting a building that is calculated with Scientific Certainty. Luxfer actually furnishes Daylight, not glass alone.

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Always specify Luxfer Prisms.

Our experts are at your service;

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To the frequent question, "Will 'Prime White' road oil produce all the results of the black road oils?"

NO

1. It does not last as long as a good black oil (Asphaltoilene).
2. It is not a road binder.
3. It does not, like all black oils, require an engineer or special machine for applying it.
4. It does not leave any black stain or muck.
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6. It will not soften and be nasty in wet weather or spring.
7. It will not stop traffic for a moment.
8. It will not require a top dressing.
9. It will not soil shoes, clothes or carpets.
10. It will not meet the requirements of engineers who are seeking the impossible or impractical.

IT WILL

1. Lay the dust on any road.
2. It will be clean, odorless and colorless.
3. It will leave no black dirty mess to be tracked into houses.
4. It will improve and preserve any road.
5. It can be applied any time of year.
6. It costs only a fraction of any black oil.

BUT

Don't take our word (or anybody's). See it for yourself.
Ask for sample of "Prime White". (It costs you nothing).
Also illustrated book, "Road Bitumens, Their Scientific Use and History."

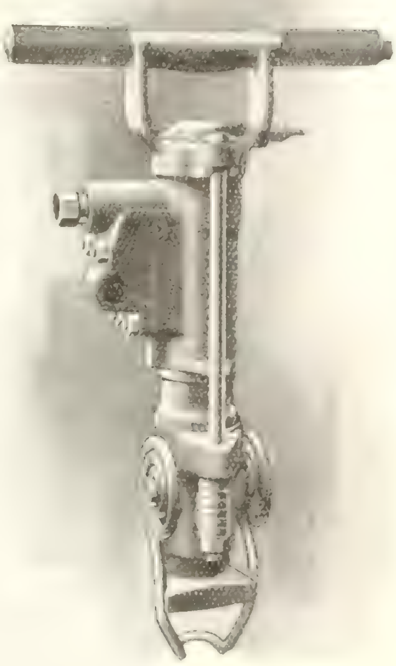
"Prime White" Road Oil Co.

CINCINNATI, OHIO

THE ROCK DRILL OF THE FUTURE

"Butterfly Valve" hammer drills are destined to be the coming factor in rock drill costs.

The introduction of the "Butterfly Valve" has revolutionized hammer drill construction. These tools are light rock drills without mountings. They are being used today for all kinds of rock drill work from block holing to shaft sinking. Coincident with the introduction of the Butterfly Valve we have made other improvements in Rand tools. These improvements have simplified design, increased drilling capacity and reduced maintenance costs.



'BCR-43' Hammer Drill with Automatic Rotation of Steel. For use with steam or air.

'BA-23' Hammer Drill. For use with steam or air. Weight 43 pounds.

The adoption of the "Butterfly" Valve has proved the most successful event in the history of the hammer drill. Rand tools embody the best principles of the earlier rock drills combined with the advantages of the hammer type. The illustrations show those new tools to have separate front heads, buffer springs on the side bolts and other rock drill principles. Every part is as simple and plain as is possible to make it. Using materials suitable for each part and simplifying design has reduced the cost of upkeep to practically nothing.

The enormous drilling capacity of these tools is far greater than anything ever offered to the trade. Every ounce of power consumed is devoted to actual drilling, as the Butterfly Valve operates on a pivot and is absolutely frictionless. It advances to its seat instead of sliding thereon. The longer it runs the better it fits.

Experience gained from forty-one years drill building governs the design of "Rand" drills.

We have branches and warehouses within twenty-four hours' distance from any Canadian point, assuring quick service. Our sales force has authentic information for the use of our customers. Let us work out your drill problem together.

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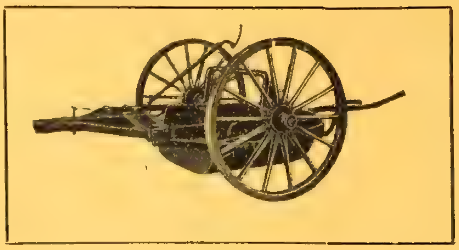

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We carry a full stock of all sizes for immediate shipment.

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"Boss" Scraper.

Our Scrapers are the leading Drag Scrapers everywhere. All our Scrapers are absolutely seamless throughout and are superior to any others upon the market.

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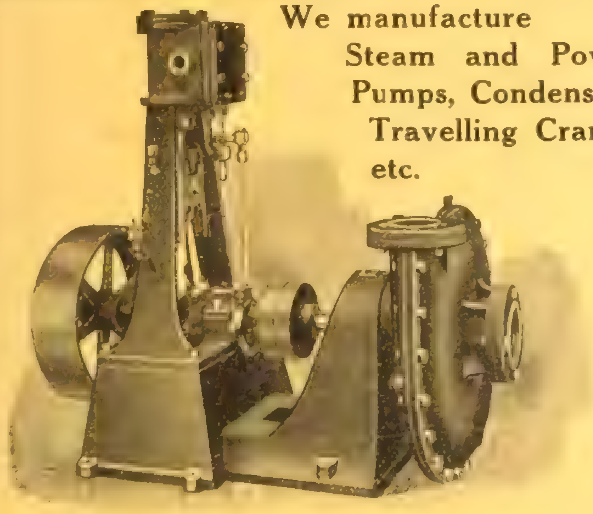
Vol. 26 Toronto, April 17, 1912 No. 16

Contract Record and Engineering Review

ESTABLISHED 1886



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Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

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consider value of more importance than price and buy Rand Machinery

Sheet Pile Drivers
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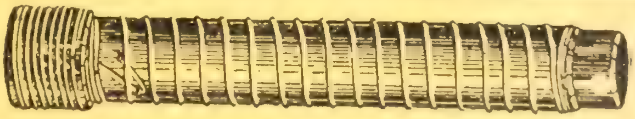

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for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

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Full Particulars and Estimates Furnished

Alphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6

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With Weatherproof Insulation

Slow Burning Wire

Slow Burning Weatherproof Wire

Bare Copper Wire

Imperial Wire & Cable Company Limited, Montreal

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1. The best Veneered Doors manufactured.
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Send your lists for quotations.
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"of great value to every contractor, architect and engineer"—"just what I've needed"—"the most valuable handbook on fireproof construction I ever read"—"I find it very valuable"—"many thanks for the book"—a few remarks by Canadian architects and engineers who have read

"Factories and Warehouses of Concrete"

THIS handbook of practical information on modern fireproof construction was compiled—at great expense—to fill a real want, to supply reliable data on a subject in which every architect, engineer, contractor or prospective builder is intensely interested.

That it has completely fulfilled its purpose is proven by the many words of appreciation from those who have read it, including editors of such technical publications as the "Canadian Engineer" and "Construction."

The cost of publishing this book was greater than any one company could well afford and its publication was only made possible by the "clubbing together" of practically every company in the United States and Canada, thus sharing the expense.

The book contains 224 pages, photographic reproductions of 230 buildings, interior views giving valuable suggestions for arrangement, fac-simile letters from owners and occupants telling their experience with concrete, and the most comprehensive article on concrete's possibilities, and adaption ever written.

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CANADA CEMENT COMPANY LIMITED
PORTLAND CANADA CEMENT
MONTREAL
CANADA CEMENT COMPANY LIMITED
MONTREAL

Full data are given on the cost per square foot, per cubic foot, floor loads, window area, insurance, etc., for different types of structures.

Have you asked for your copy ?

If not, you'd better tell your stenographer to write a note now the edition is limited. The book will be sent to any Canadian Engineer, Architect, Contractor or Manufacturer who asks for it, enclosing 12 cents in postage.

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Double Acting

Rapid Stroke

ARNOTT STEAM HAMMER

Made in 8 Sizes

Can also be worked with air

For the Lightest Sheeting
or the Heaviest Piles

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What a Contractor Needs-
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HAMMER DRILL

Fastest Boring Hand Hammer Drill
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Not a Toy but a Real Rock Drill

Will bore to 15 feet in depth with economy
Has automatic rotation device, placing it far
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The Simplex only weighs 26 pounds

Its air consumption is remarkably low.

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Air Compressors
- Abenaque Machine Works
- Canadian Rand Co.
- Escher Wyss & Co.

Architects
- [illegible]

Architects' Levels
- Watts & Son, E. R.

Architectural Iron Work
- Canada Wire & Iron Goods Co.
- Dennis Wire & Iron Works
- Meadows Co., Geo. B.

Architectural Terra Cotta
- Asbestos Mfg. Co.
- [illegible] Brick, Ltd
- Don Valley Brick Works
- Northwestern Terra-Cotta Co.
- Toronto Plate Glass Imp't'g. Co.

Asphalt Plant
- East Iron Machine Co.

Asphalt Floors
- Can. Mineral Rubber Co.

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- Canadian Boving Co.
- Inglis, John
- Jenckes Machine Co.
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- Waterous Engine Works Co.

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- Galt Engineering Co., John
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(Continued on page 12)

DON VALLEY BRICKS

Residence of Mr. J. C. Eaton, Toronto. Messrs. Wickson & Gregg, Architects

Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

Montreal Agent: **David McGill, 83 Bleury Street**

Most mixing Least Fixing

M-C
Rail Track Concrete Mixers
(Non-Tilt)

have, as ***one*** of their features just a little better than the best, trunnions that are rolled from a single

Standard Rolled Steel Rail.

This feature excludes all possibility of any scalloping, or breaking through the drum. How about the one you're using now?

Another feature is the main drive gear, made of *Semi-steel* in jig machine segments, absolutely interchangeable. These may be removed in a few minutes *without removing the drum or disturbing any other part of the mixer.*

Some More Distinctive Features:—

Friction clutch and brake on the extension of main drum shaft; hoisting drum and gear are on the extension of rear trunnion carrying the *roller-bearing car wheels* on which mixer runs. We furnish these *shafts extended* so if elevating charging hopper is not bought with original order it can easily be attached later. M-C Standard rig can be equipped with an elevating charging hopper ***in the field*** by use of a few simple bolts. ***This is true of no other mixer in the market.***

The M-C line of concrete machinery is now *Made in Canada* **by**

The FORD IRON CO.
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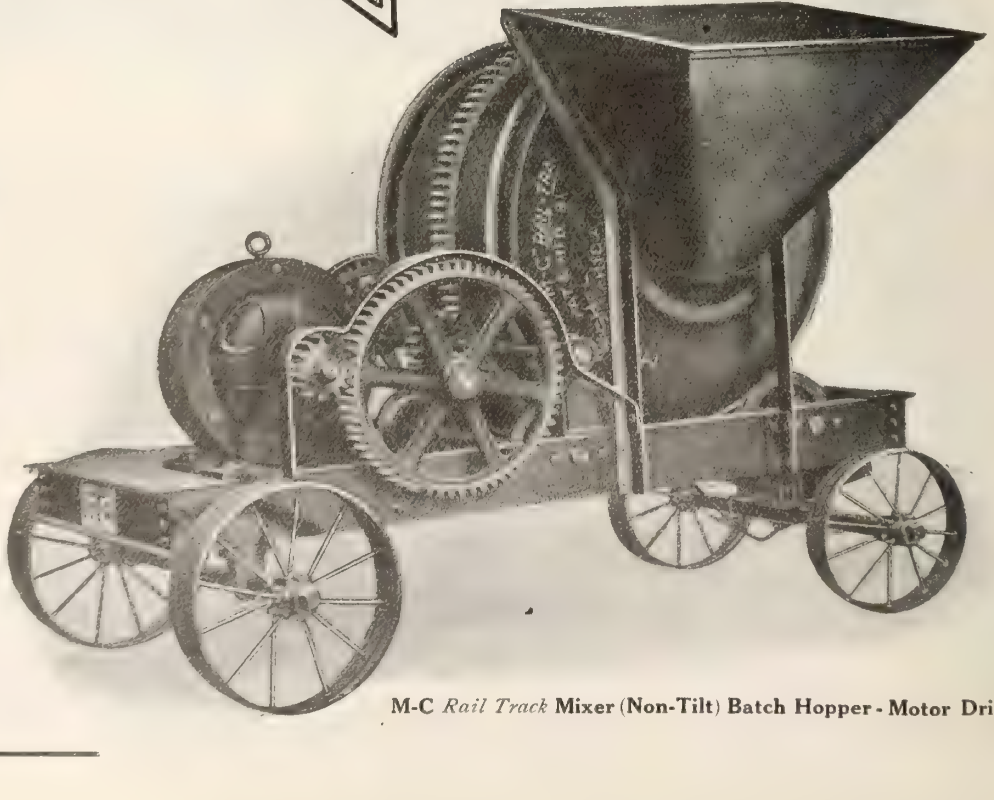
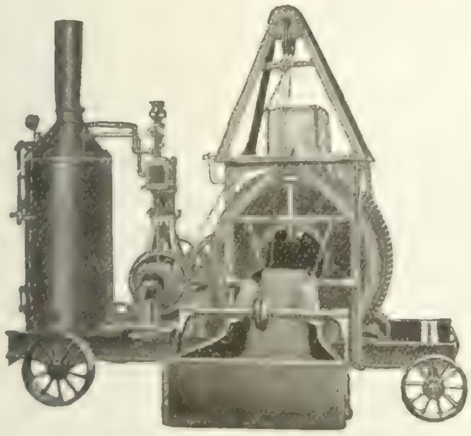
Phone Main 7600



M-C *Rail Track* Mixer (Non-Tilt) Batch Hopper - Motor Driven

London Concrete Mixers

are built in Many Styles and Sizes


London Standard Drum Batch Mixer

The MANY NEW and IMPROVED features of the LONDON MIXERS appeal to the contractor.

London Automatic Batch Mixer No. 2

The Enormous Sale of those machines is sufficient proof as to satisfaction they are giving. Everything made in our own shops.

Every machine HIGH GRADE

Every machine sold under a STRONG GUARANTEE

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SEND FOR OUR 1912 CATALOGUE which shows our complete line. 160 pages of illustrated matter. IT'S A DANDY.

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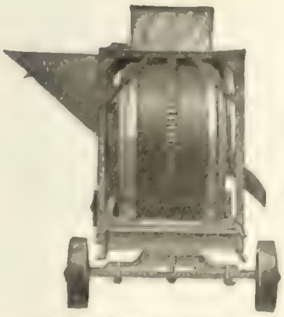
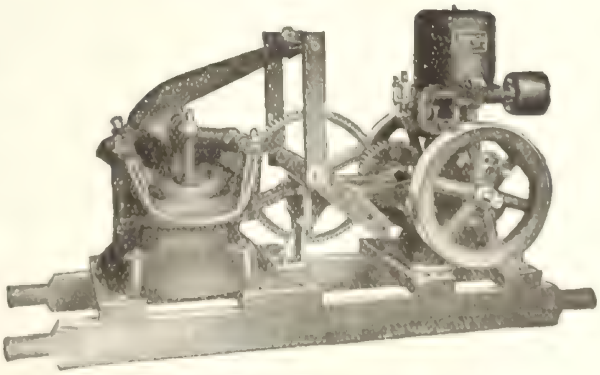

London Standard Drum Batch Mixer

WE ARE THE LARGEST MANUFACTURERS OF CONCRETE MACHINERY IN CANADA. That is why we can sell at such remarkably low prices.

Manufacturing in large quantities reduces the cost of production.


Power Diaphram Pump Operated with Gas Engine

London Concrete Machinery Co. Limited

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We are the Largest Manufacturers of Concrete Machinery in Canada

The Heart is the Vital Part of Man

If it was irregular it would mean a BREAKDOWN.

The **Drum** is the **Vital Part** of all **Mixers.** If it **breaks down** the whole **job** is **stopped. Test** after **Test** has proved that the efficiency of the **Patented, Heart Shaped, Drum Mixers** gives **Long Life and Perfect Mixture.**

Write for 1912 Catalogue. Built in sizes from 2 cubic ft. to one yard machine

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For Sidewalk, Concrete Road and Other Contracts

We can furnish crushed stone in all sizes, clean and free from dust, dirt and mold, and evenly graded. The coal situation makes it important to place contracts with us.

We can give guarantees of delivery at present, and will accept a certain number of contracts now, with guaranteed delivery dates. Wire, phone, or write these orders now.

Plants at Dundas and Vinemount.

Good Portland Cement

Write for Quotations and Particulars.

Plants at Atwood, Hanover, Kirkfield, Orangeville, Owen Sound, St. Mary's and Wiarton.

Order Crushed Stone now. We guarantee delivery. Wire, phone or write us at once.

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  Metal Shingle & Siding Co.
  Noble, Clarence W.

(Continued on page 14)

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Our Asphalt Mastic Floors will stand the hardest kind of wear and will **last the life of the structure.** In case of re-modeling, the floor may be taken up, broken into pieces and by adding and re-heating a small amount of "PIONEER" ASPHALT, can be re-laid at a nominal cost. These floors are flexible and elastic, thereby materially reducing the noise attendant upon trucking. They are waterproof, acid-proof and will not dust. Illustrations show exterior and interior views of The Willams Bros. Co. (Preservers), Detroit, Mich., one of many big American plants in which our floors have been installed.

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503 Canada Building, WINNIPEG, MAN.

MUNDERLOH & Co Ld.
MONTREAL.

SEAMLESS STEEL TRACTION AND LIGHTING POLES.

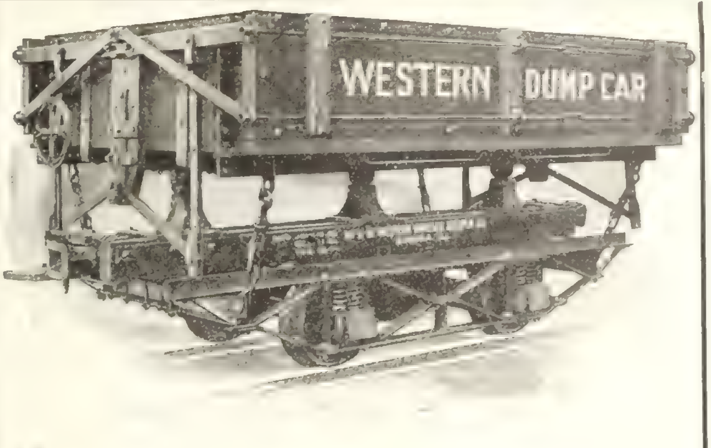
MANNESMANN SEAMLESS STEEL PIPES FOR GAS & WATER MAINS.

IN LENGTHS UP TO 40 FEET.
AN IMPROVEMENT ON CAST IRON.
ALL PIPES TESTED 75 ATMOSPHERES BEFORE LEAVING WORKS.

WRITE US FOR ILLUSTRATED BOOKLET.

SEND US YOUR ENQUIRIES.

WE ARE SOLE AGENTS IN CANADA FOR—
MANNESMANN TUBES.
FOR ALL PURPOSES.



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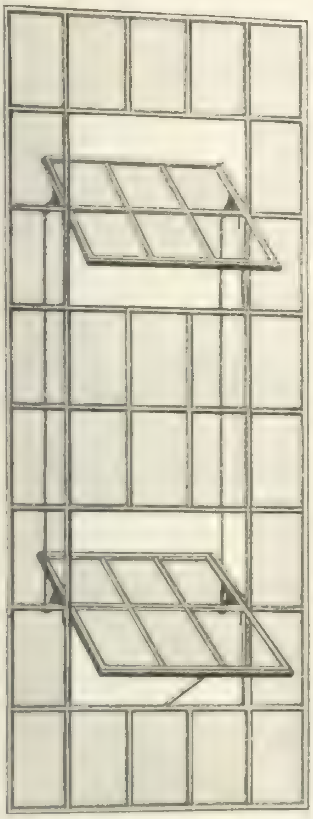

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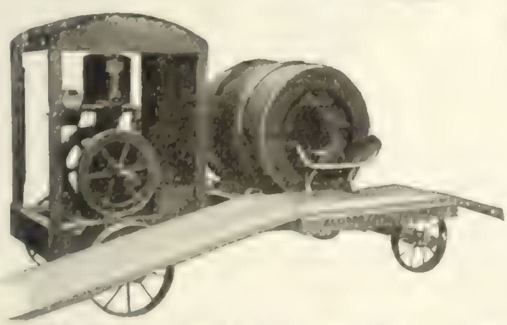

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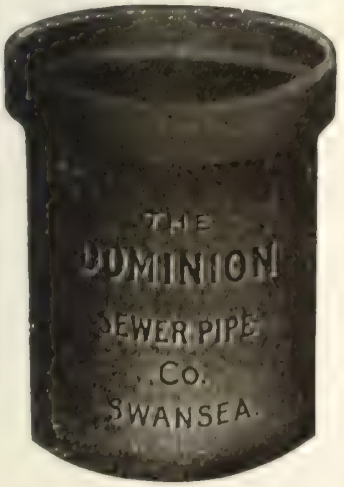

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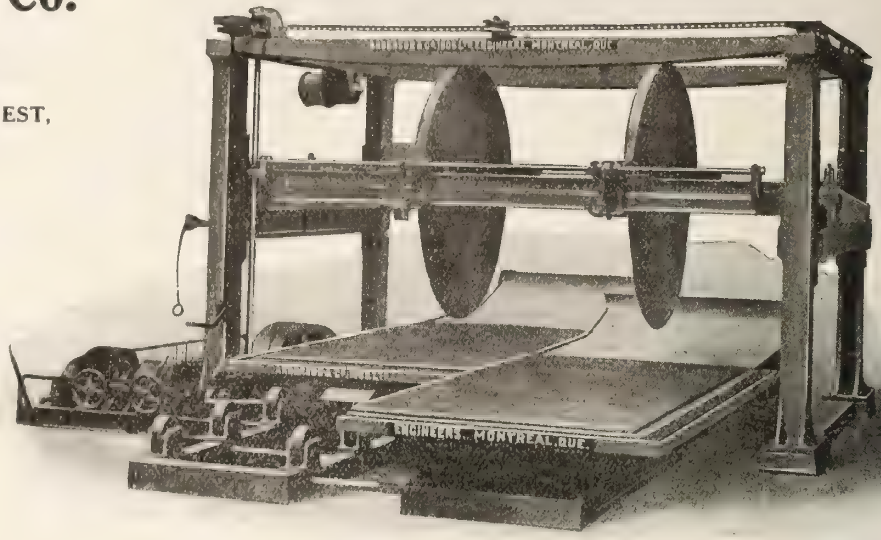

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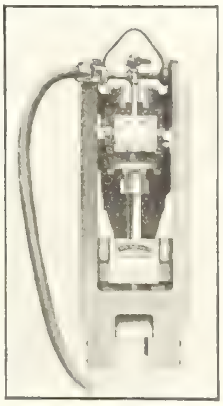

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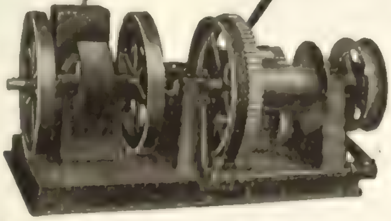
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Every up-to-date builder or contractor should post himself on the most economical way to elevate building material. We have prepared an interesting booklet on HOISTS and ELEVATORS which we will send to any one interested.

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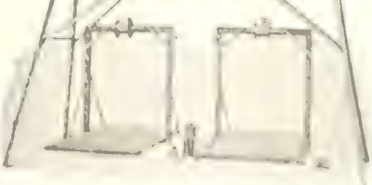
Lansing, Mich. U.S.A.

"A. R. Williams Machinery Co., Ltd., Canadian General Agents, TORONTO, ONT."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Is the only manufactured stone which can be cut and dressed, to give the same appearance as NATURAL STONE.

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Corinthian Stone is unequalled for Strength, Appearance and Color Especially adapted for Bank and Office Buildings

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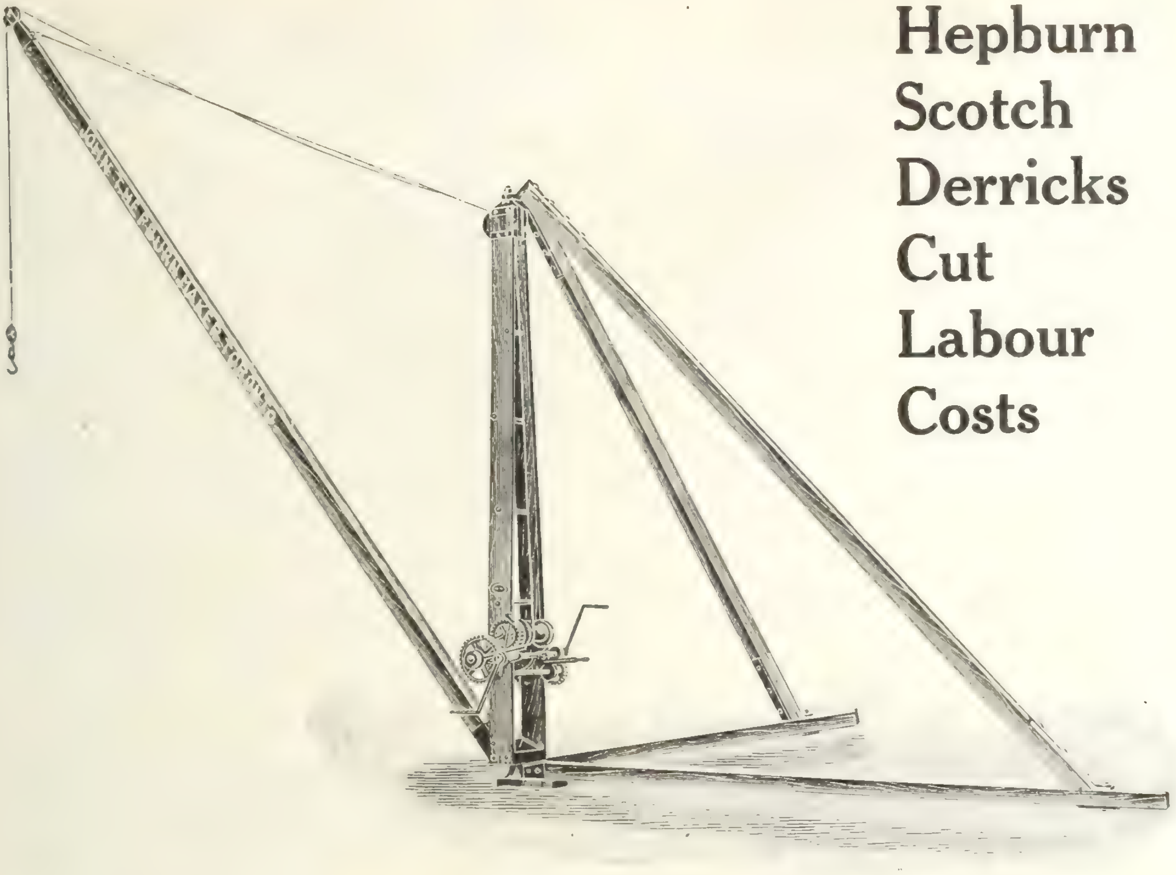
Agents at Toronto: E. MacDonald & Sons, 176 King St. E. Toronto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To Build a Good House You must have good materials

We build Derricks—and the same holds good. You get so **much more** out of a Hepburn Derrick, just because we put so **much more** into it.

¶ We use only the finest timbers. Each one is carefully selected for its special purpose.

¶ All castings are made in our own foundry. All forgings are forged by our own blacksmiths.

¶ From first to last Hepburn Derricks are Hepburn-made. We **know** every part is **right** before it goes in.

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Steel Curb and Gutter Forms

Lineal Feet Built, 9,983.
Time 200 Hours.
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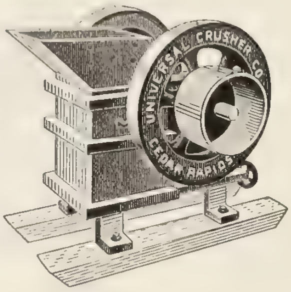

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Instantly adjustable to crush to any desired size from 2½ in. down to sand in one operation. Makes a uniform product in every size. Gives maximum capacity, using half the power. Recognized as standard. It will save you money.

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CEDAR RAPIDS, IOWA, U. S. A.
Mussens, Ltd., Montreal, Canadian Representative

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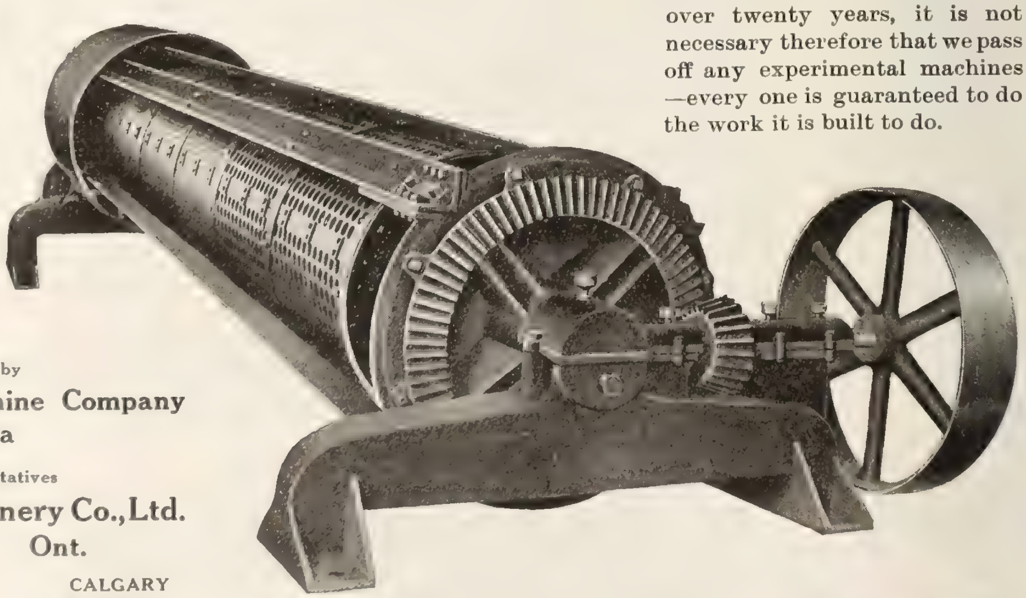
Looking at feed end of screen



Size 48″ dia. 28 feet long.

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Contractors, Road and Street Machinery of every description.

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Means Just This:

Accuracy, uninterrupted service, without frequent and expensive repairs and the application of the right principles of construction and operation to specific needs.

Let us tell you something of the efficiency of our Water Meters and the various types which we manufacture

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The flow of water is downward through the meter's works which tends to flush out all sand and sediment and to keep the meter in an operative and sanitary condition.

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BUFFALO METER CO.
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for Engineers and Contractors

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We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

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It will interest you

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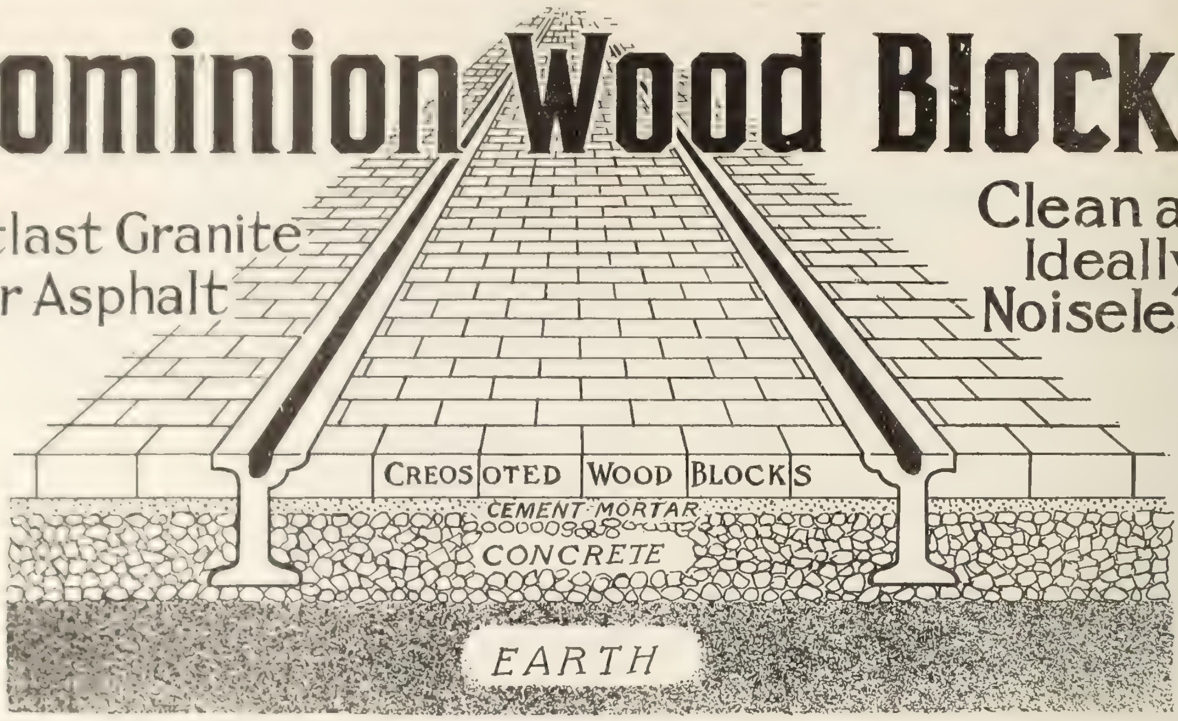
Outlast Granite or Asphalt

Clean and Ideally Noiseless



The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

Dominion Creosoting Company
LIMITED.
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NO PAINT Ever Needed on this Roofing
ATLAS PORTLAND CEMENT CO. HANNIBAL, MO. covered with over 200000 Sq. Ft. of J-M ASBESTOS ROOFING

The need of coating or gravel on a roofing is positive proof of its weakness—positive proof that the materials in the roofing would dry out, rot, rust, decay or otherwise deteriorate without such protection—positive proof that the roofing itself can't last long unless protected with a *mineral*.

Instead of a perishable animal or vegetable material only *temporarily* protected with a *thin layer of mineral*, such as paint, slag or gravel, J-M Asbestos Roofing is *one solid mass of minerals*. Not a particle of perishable material in it.

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J-M ASBESTOS ROOFING

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We'll sell you J-M Asbestos Roofing direct from our nearest branch if your dealer won't supply you.

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We want you to see the curious Asbestos Rock which yields the long, soft, pliable yet practically indestructible fibres from which we make J-M Asbestos Roofing, Theatre Curtains, Stove Mats and hundreds of other Asbestos products. We know it will convince you better than anything we can say that a roofing made of this indestructible stone must also be practically everlasting.

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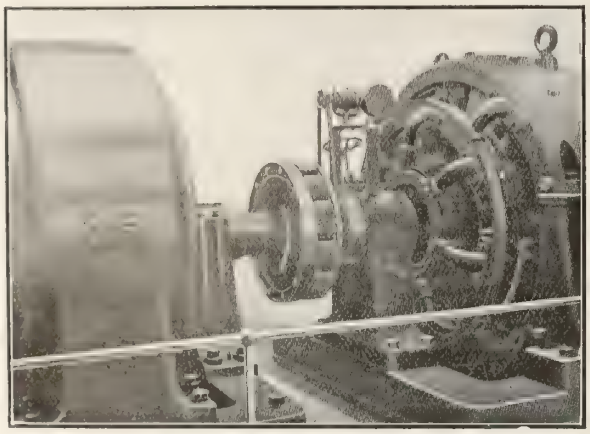

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The Steel Company of Canada Limited
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PLAIN ROUNDS,
& SQUARES,
COLD TWISTED
SQUARES

MAXWELL
DEFORMED BAR

STEEL BARS
for Reinforcing
Concrete

Mr. City Official:

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The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

Send for Catalogue. C.R.

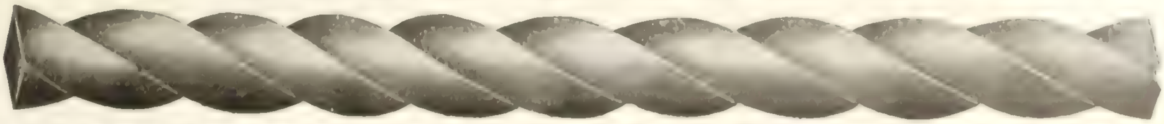
THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

Canada Steel Co., Limited, Hamilton, Ont.

(Independent of all mergers)

Manufacturers of **STEEL**

For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.



ANGLES from [illegible] up to [illegible]
ROUNDS and SQUARE from [illegible] up to [illegible]

We can ship from stock

FLATS from ½ in. up to 4 ins. in width, and [illegible]

Ask us for prices—they will interest you.

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ALL TYPES **CRANES** **ALL SIZES**

Hand and Power Driven

OVERHEAD TRAVELLERS WORKED FROM ABOVE OR BELOW
FORGE OR FOUNDRY CRANES IN STEEL OR WOOD
WHIP OR PLATFORM CRANES FOR WAREHOUSES, ETC.
WALL OR COLUMN CRANES—USEFUL IN ALL PLACES
PORTABLE OR STATIONARY WHARF CRANES
SINGLE GIRDER TROLLEYS, RUNWAYS, ETC.
DERRICKS OF EVERY DESCRIPTION. STEEL OR WOOD

Our **HAND CRANES** combine lightness with strength and special care has been taken to so proportion the parts that the load may be raised with the least expenditure of manual labour.

Our **POWER CRANES** will be found speedy in action, and on examination will show that we allow a larger margin of strength in proportion to the power than most other manufacturers.

Our experience and advice will be found worth having; let us know the nature of your business and we shall be pleased to advise the best equipment for your purpose.

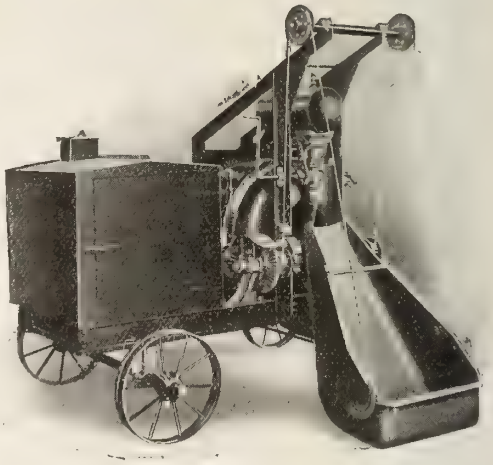
International Marine Signal Company, Limited
OTTAWA, ONTARIO

On All Classes of Work KOEHRING MIXERS are mixing their way to popularity because of the Dollar Saving Qualities

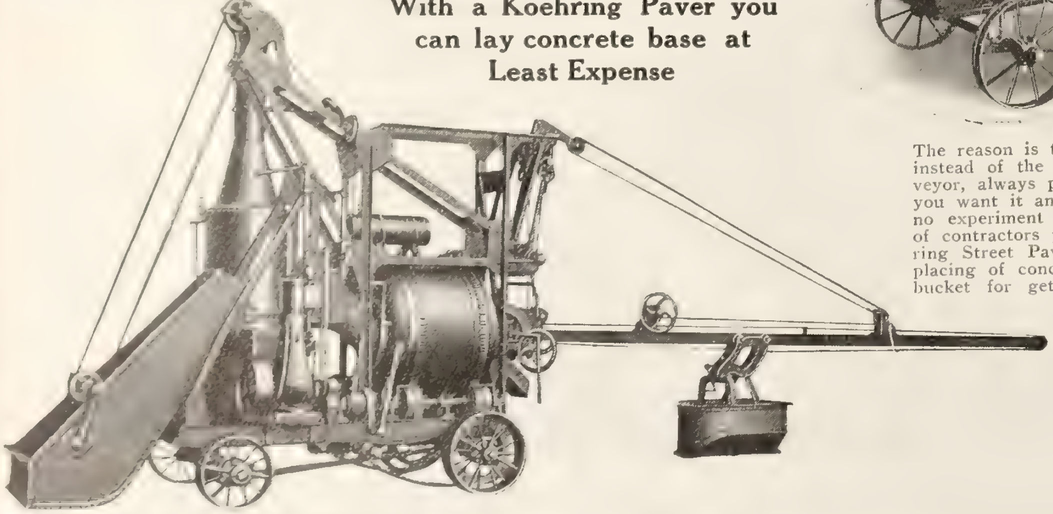
The Koehring 3 in 1 principle of mixing means three times as much mixing or an equal amount of mixing in one-third of the time. There are three independent and opposed mixing actions in the Koehring drum producing thoroughness of mixing and rapidity of mixing and a uniformity of mixing, no other Mixer equals. There are also equally important advantages in the mechanical construction of the Koehring Mixer.

The heavy cast special metal Koehring drum will outlast the drum of any other Mixer. The railroad truck bearing truss and the rollers being keyed on to the axle, makes "wabbly" drums impossible.

The charging bucket raises to a nearly vertical position so that all the material will pass into the drum without pounding the bucket. There are numerous other important features in the Koehring Mixer that you should know about.



With a Koehring Paver you can lay concrete base at Least Expense



The reason is the machine conveys the concrete instead of the men, and it's a dependable conveyor, always places the concrete exactly where you want it and always dumps clean. There is no experiment about it, the records of dozens of contractors prove the economy of the Koehring Street Paving Mixer and it combines this placing of concrete with a simple charging bucket for getting material into the drum in shortest possible time and least number of men, also, it has traction drive for moving the machine along the line of work and keeping close to the material pile. This builds contractors reputations and pays handsome profits. Aren't you interested in this reputation and profit making

KOEHRING MACHINE CO., Milwaukee, Wis.
Toronto Montreal Halifax Ottawa Cobalt

Exclusive Sales Agent for Canada: **Canada Foundry Co., Limited**
Winnipeg Calgary Vancouver Nelson

We Make Good Stone

Canadian Bank of Commerce, College St. and Spadina Ave., Toronto. Darling & Pearson, Toronto, Architects

Roman Stone Has Advantages Over Natural Stone

Its strength (being reinforced), its durability and its fire resisting qualities have been clearly proven. The hundreds of buildings of Roman Stone are permanent evidences of its stability and beauty.

Roman Stone makes a decorative facade possible where the cost of the same work in natural stone would be prohibitive. It is equally adaptable to Public Buildings, Churches or residences.

The Roman Stone Company

LIMITED

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and Stone Yard
WESTON - ONTARIO

Business Office:
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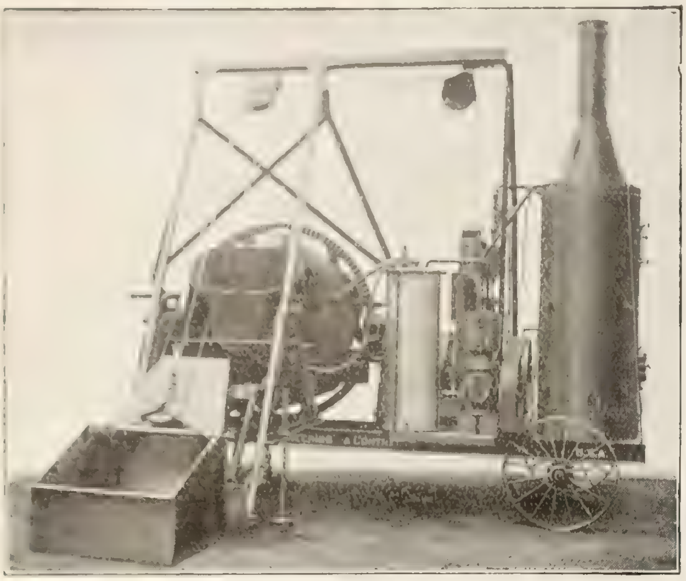
T. A. Morrison & Co.
204 St. James St., MONTREAL
Sales Agent for Quebec

A Continuously Even and Regular Heat



The cube principle of mixing produces the most perfect concrete that can be mixed.

is secured by a Chicago Improved Cube mixer with Hot Mixing Attachment. An oil spray burner at whatever point it is "set" delivers just the same amount of oil and air from hour to hour so that the number of heat units generated is always the same. Since the Austin combustion chamber opens directly into the mixing drum and has no other opening for heat to escape an even amount of heat is delivered hour after hour into the drum. Bear in mind that the combustion chamber is a fixed part of the mixer drum and partakes of its every movement, therefore heat is supplied to the drum in every position—not merely when it is mixing to be shut off when it is tilting. No vagaries of firing the boiler or of steam pressure have to be watched. The heat supply is automatically even and continuous. **An even heat means an evenly heated mixture, batch after batch, which is a prime requisite in bituminous concrete paving.**

Send for "Special Circular No. 8, describing Cube Mixer with Heating Attachment"

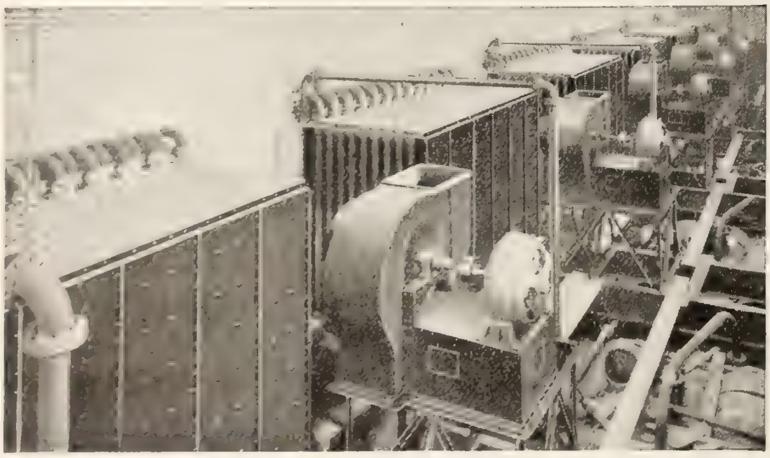
Municipal Engineering & Contracting Co.

Main Offices—Railway Exchange, Chicago, Ill., U.S.A. New York Office—30 Church St.

Represented in Western Canada by the Canadian Equipment and Supply Co., Vancouver and Calgary

Agents for Eastern Canada—Lecky & Collis, Napanee, Ontario

AGENTS WANTED IN UNOCCUPIED TERRITORY



At the Power Plant of The Denver Tramway Co.

are installed

6 Sturtevant Metal-to-Metal Joint Economizers. *No Gaskets.* Capacity 300 Lbs. Pressure.

6 Sturtevant Multivane Induced Draft Fans direct connected to

6 Sturtevant Commutating Motors.

All working in connection with 6 Sterling Boilers 4200 B. H. P.

"Economical Fire Room Methods," by F. R. Low, Editor of Power; Sturtevant Bulletin No. 187-N describes the operation and equipment of one of the most efficient and economical power plants in the world, The Wood Worsted Mills, Lawrence, Mass.; told in a most interesting manner by one of the foremost technical writers in this country. It is yours for the asking.

B. F. Sturtevant Co. Hyde Park, Boston, Mass.

853

Eadie-Douglas, Limited, Montreal Polson Iron Works, Limited, Toronto

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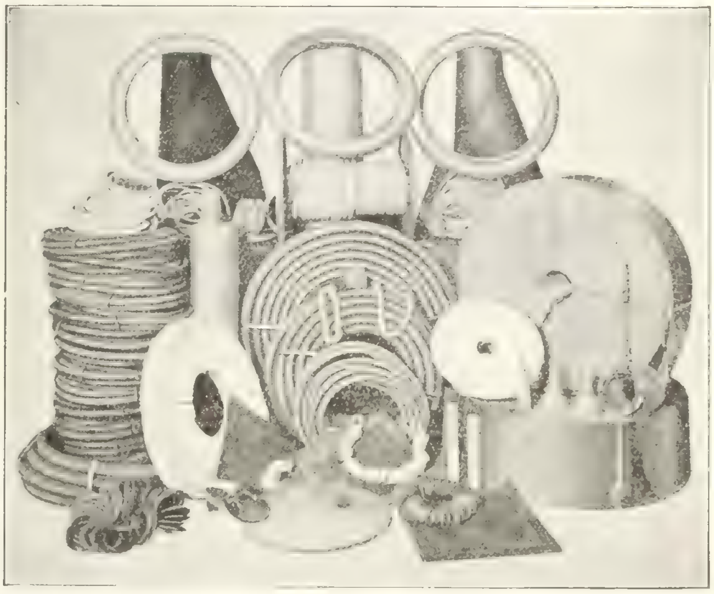
Only Reliable Suction Hose

If you are in the market for **hose,** don't do a thing until you look into the money-saving reasons why you should buy

GOODYEAR Suction Hose

Money-Saving Hose for Contractors, Miners, Dredgers and Others Demanding Hose-Permanency and Hose Strength.



A few of the lines we manufacture

Longer service, more ***stand-up-ability,*** greater freedom from constant repairs, would make Goodyear Suction Hose an economy at double the price. But it ***costs no more*** than the other kinds.

Non-Collapsible — Non-Rotting

Goodyear Suction Hose never caves in. It is built by a process that makes this impossible no matter how long the hose has been in use. It is built around a heavy steel spiral wire imbedded in the inner tube. Tube can't separate from wire nor can dampness reach it. Hence, rust and rot, one of the common failings of other makes of suction hose, is ***done away with.***

Suction Hose for Oil and Gasoline

We make rough or smooth bore Suction Hose for all purposes; also a complete line of

Water, Steam and Air Hose

Send at once for our catalog. If you are in doubt as to what kind of hose you need, let our expert help you solve your problem. Write us to-night.

Our sales of the last four months 50% greater than those of last year. Defective goods returned only $23.93

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13

The Chain Belt Way

MEANS MIXING and elevating Concrete in the shortest time, at the minimum cost per yard. This photograph shows the CHAIN BELT ELEVATOR and the CHAIN BELT MIXER at work on the Boston Store, Milwaukee. Concrete is being laid at two floors at the same time. This Elevator is of steel—self-supporting—requires no tower—has the simplest tripping device, and operates with speed and smoothness.

No More Breakdowns, No More Delays, is the slogan the users of CHAIN BELT CONCRETE MACHINERY have adopted. Ask the Contractor who owns a CHAIN BELT MIXER what he thinks of the CHAIN BELT DRIVE—the DRIVE, by the way, which we guarantee for two years. Dollars to cents he says, "No more gear-driven machines for me."

Mr. Contractor, you are wasting your time, energy and money by fooling around with a gear-driven machine. Be up to date. The CHAIN BELT DRIVE is far more practical, because it is smoother running—less friction—consumes less power—and then you don't have any gears to get clogged or wear out. As mentioned before, we guarantee this CHAIN BELT for two years. Are your gears guaranteed for this length of time? We have been selling Mixers for four years now, and haven't replaced a link of CHAIN BELT yet. We think this is a pretty good record.

Send today for information.

Chain Belt Company
MILWAUKEE

Montreal, Que., Can.
Canada Machinery Agency

Ottawa, Ont.
The General Supply Co. of Canada

Vancouver, B.C.
Dominion Equipment & Supply Co.

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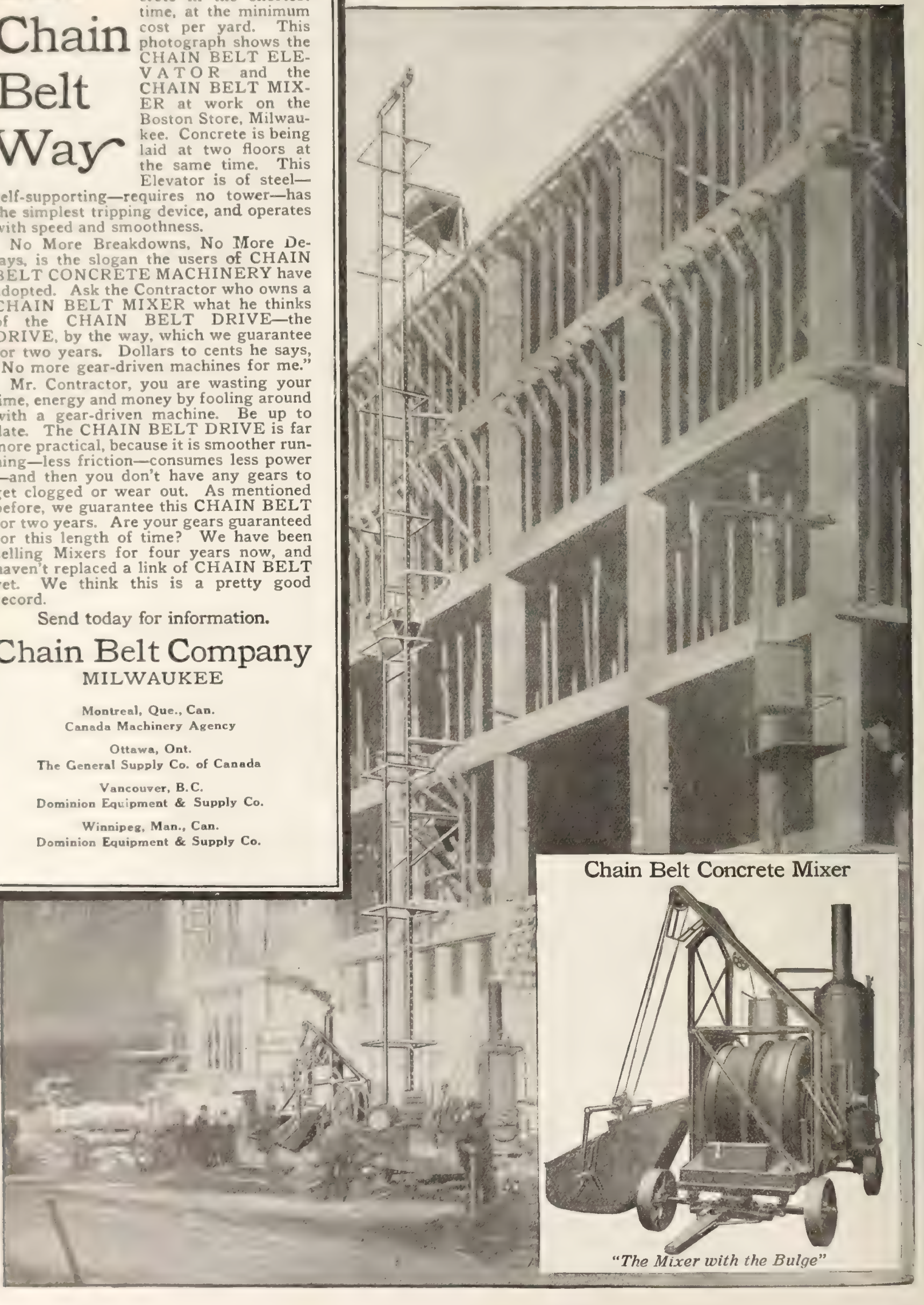
Dominion Equipment & Supply Co.



Chain Belt Concrete Mixer

"The Mixer with the Bulge"

STEEL

Toronto Warehouse

Angles, Channels, Tees,
Flats, Rounds, Squares.
Carnegie Welding Steel.

Mill Shipment

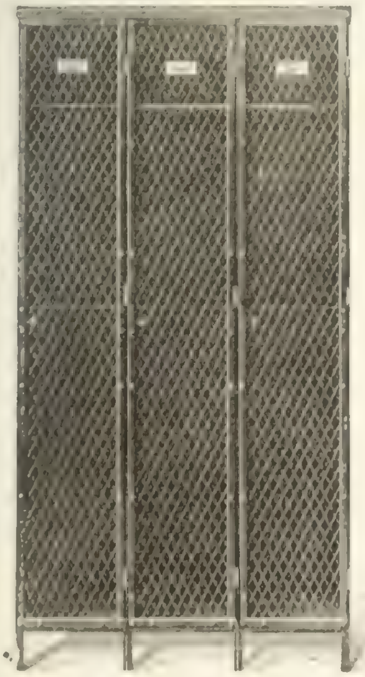
Structural Shapes, Bars,
Plate: Tank, Boiler, Flange
Rails, Sheet Piling.

Factory Products, Limited

STEEL DEPARTMENT

220 King Street West - TORONTO

'Meadows' Metal Lockers



Make friends because of their substantial construction and unique features. We make several styles and sizes of these lockers. We'll know what you want if you just hint at your requirements.

Send for our interesting booklet entitled

"Locker Lore"

GEO. B. MEADOWS

Toronto Wire, Iron and Brass Works Co., Limited
TORONTO, CANADA

Tenders Wanted

should be advertised for in the Contract Record "Tenders and For Sale Department." This paper is the "Tender Ad." medium of Canada and always brings bids from the reliable contractors and supply houses.

File your plans for any work you are inviting bids on, in our offices at Toronto, Montreal, Winnipeg or Vancouver.

Contract Record
Toronto Ontario

Garlock Steam Hammer Rings.

Contractors' Supplies

We make a specialty of Steam Hose, Air Hose, Water Hose, Suction Hose, and Dredging Sleeves.

TRADE THE GARLOCK PACKING CO. TRADE GARLOCK MARK HAMILTON, CANADA MARK

Steam Hammer Rings, Air Compressor and Hydraulic Packings of all descriptions.

All Garlock Products are made up to a standard—not down to a price.

Write to-day for Garlock Catalog—Handsomely Illustrated 112 Pages.

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PIONEERS IN THE PACKING BUSINESS

SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

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GENERAL OFFICES AND FACTORIES · PORT HOPE · CANADA

SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

Ideal STANDARD

Automatic Individual Bowl Syphon Action Range Closet

The most perfect range closet ever produced.

Write for our Booklet "E"

showing our Range Closets and Urinals and giving roughing measurements.

Plate F. 517

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ESTABLISHED 1886

Contract Record and Engineering Review

PUBLISHED EACH WEDNESDAY BY

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Page 16

Vol. 26 April 17, 1912 No. 16

Should a Dozen Firms Figure the Same Quantities?

IN English contracting circles some dissatisfaction has been expressed of late because quantities were not supplied on a number of important works. The contention is that if the quantities are made up by the engineers of say twenty different contracting concerns the skilled labor of nineteen of the engineers thus employed is lost.

The quantity surveyor has not been taken up in Canada, but there would seem to be strong points in his favor. Certainly it would seem that the expense of taking out quantities by a number of individual contractors was unnecessary and one that should be avoided. Where quantities are provided the cost is a comparatively small addition to the general expense of the undertaking, but where each contractor has to figure out his own quantities, the expense is a dead loss to all but the successful tenderer. There may be objections to the system, but are these sufficiently weighty to stand as a permanent barrier to its adoption.

Let us assume that the cost of furnishing quantities on a certain building work is $100. If these are supplied, the expense ends with the $100, but if a dozen firms have to furnish them it runs up to $1,200. This looks like a clear waste of $1,100.

One of the greatest advantages in the supplying of quantities lies in the elimination of costly mistakes and speculation on the part of the contractor which frequently bring about disaster not only to the contractor but to the promoters of the enterprise. The Toronto City Hall might be cited as an example. Economy in building work depends largely upon competition, but the only kind of economy that is worth while is that which is consistent with first-class, reliable work. If a man make a serious mistake in his figuring and be compelled to abide by it, he will have to scamp certain portions of the work to "even up" on the contract. We have known corporations compel contractors to stand by mistakes in estimating, even when it has been shown clearly that a remarkable omission has been made in figuring on the plans. We are very doubtful whether it is right and advisable to forfeit a contractor's cheque under such conditions. We suppose that the city should be protected against mistakes and that some sort of penalty should be exacted in the interests of those who do not make mistakes, but the forfeiture of an unreasonable amount is not a good precedent in that it tends to encourage the unscrupulous idea of "getting even" rather than sacrifice the job. Then the element of speculation should not enter into the business of the contractor as much as it does. When quantities are furnished there is uniformity in bidding. Each man figures in the same manner upon the same work, and the only variables are the resources, staff and equipment of the respective firms.

The question is one that we should like to see discussed in these columns. The points involved should be worth some consideration, especially at the hands of the bigger men in the business.

Engineers as Mayors of Cities

THE election of an engineer-mayor at Seattle leads to a consideration of the particular adadaptability of members of the profession to the premier municipal appointment. The matter is considered editorially by Engineering & Contracting, which contrasts the value of such men with that of lawyers, business men and politicians who are usually elected to the position. The observations made by our contemporary are worthy of note:

> The election of Mr. George F. Cotterill, mayor of Seattle, Wash., suggests the special fitness of experienced municipal engineers to serve as mayors of cities. Since a very high percentage of the business transacted by a city is handled by the public works department or, in the case of new construction work other than the natural extensions to existing works, is handled by commissions appointed for that purpose, the value to the city of a mayor with experience in engineering enterprises is apparent.
>
> In the case of Mr. Cotterill it so happens that he was not chosen mayor on account of his engineering knowledge, but it is evident that, other things being equal, his experience as an engineer will make him a more competent executive than a lawyer, business man, or politician could hope to become, even when actuated by the high motives characteristic of the engineer. Mr. Cotterill has been in the engineering department of the city of Seattle for the past eight years and consequently is thoroughly in touch with all the needs of the city.
>
> We have mentioned lawyers, business men, and politicians because mayors usually are chosen from those classes. It probably will be conceded that an engineer is better fitted to cope with the public works problems of a city than are the others mentioned, but on certain other questions these others may be held by some to possess advantages over the engineer. Naturally the lawyer is more skilled in the legal wording of ordinances and contracts, but the lawyer mayor is governed no less in such matters by the rulings of the city's legal department than is the engineer mayor. The business man, or the [illegible]

is understood, does not possess a single advantage over the modern engineer, who is a very capable business man himself. We dislike to weigh even single qualifications of the politician against those of the engineer yet this will be done by voters and newspapers when the choice between these types is offered. The politician has only one advantage and that is his ability to handle the various factions of the city council. However, the whole tendency of present day municipal reform is operating to make this latter consideration of decreasing weight. Moreover, no citizen is better qualified than the engineer to lead the voters in renovating the old-fashioned city council. On all questions of a general nature engineers are at least as well qualified as other men are to advise and lead the city council.

Those who are familiar with the work of the Chicago Commission on City Expenditures may recall that the experts employed by the commission estimated that $227,500 was wasted in the year of 1909 in the sewer and catch basin cleaning department. Another point brought out was the loss of $150,000 to the city in street repair contracts. Our readers will remember recent articles and editorials relating to the Chicago water works system which pointed out, among other things, that two-thirds of all the water pumped in the city pumping stations is lost by leakage and waste. All these matters have adversely affected the citizens of Chicago. In spite of the fact that the engineering department of the city repeatedly called attention to these and similar conditions, former mayors and councils failed to take any action on such matters. We do not doubt that an engineer mayor would have instituted reforms in these matters as soon as they were brought to his attention.

City engineers often are unable to design and build works according to their best judgment on account of interference with their plans by officious mayors and aldermen. This condition is responsible for much of the so-called poor municipal engineering in this and other countries. The remedy for this malady, in some cases at least, is the election of an engineer to the office of mayor. Wherever this condition exists, no one need doubt that a well qualified municipal engineer would make a strong candidate for the office.

Facing the Law

IN our issue of March 27 last we reviewed briefly the position of the engineer in the court of law. Our attention was directed to the subject by some remarks made before the Engineers' Club of Toronto by the Honorable Mr. Justice Riddell, who has since favored us with some notes of an address given recently before a gathering of medical men.

The main point of interest in these notes is contained in three rules which Mr. Justice Riddell recommends for observation. The first of these consists in having a thorough understanding of the question before attempting to answer it. If there is the slightest ambiguity about the question the witness is entitled to have it removed and the judge will see that the question is either repeated or interpreted as desired. On the other hand, it is unwise to pretend to misunderstand a plain question. Nothing is more prejudicial to the testimony of a witness than an obvious desire to fence or to spar for time.

The second rule may be stated thus: "Having thoroughly understood what is asked, answer it as briefly and concisely as possible, consistently with the truth, without suggestion of the true or suggestion of the false." Professional men are prone to sin in this regard. Called upon to testify to facts, they indulge in their opinions. Asked to give an opinion of something rightly within their competence they give an opinion upon something which is not. At the same time it has often proved a costly mistake for a witness to be lured into saying "Yes" or "No" to the demand for "a plain answer to a plain question."

For the third rule Mr. Justice Riddell prescribes: "When you have answered a question, shut up. No witness is so dangerous to his own side or so much a prey to counsel on the other as the talkative witness. The heart of counsel leaps with joy when he sees a learned brother on the other side trying to stem the flood of talk from a loquacious witness."

The simplicity of these rules does not detract from their value and importance. We are disposed to agree with Mr. Justice Riddell that if they were observed the time occupied by trials would be diminished considerably.

From time immemorial everything connected with the law has spelled anathema to those who have been brought into contact with it, but this is no reason why any of us should remain in ignorance of the methods of procedure and the meaning of cross-examination. One may go into any court of justice and see witnesses failing or refusing to understand what they are asked—answering something entirely different, and talking at random long after they should have been silent. Simple though they may seem, the points may be worth noting.

Scientific Management

Editor Contract Record :

Referring to your editorial, "Merits and Demerits of Scientific Management," published on page 39 of the Contract Record for April 10th, I may say that during the last few years I have read various papers delivered by Mr. Gilbreth, and while I agree to a considerable extent with the idea which he probably has in mind, I must say that I differ considerably from him in the methods by which he claims to have overcome certain difficulties. I agree with the remarks in your editorial to the effect that a great deal is lost if all men are placed on exactly the same basis and tied down by certain rules and regulations. I have always believed it to be good policy to lay down certain general rules to which the office staff shall conform, but I have always given any amount of leeway, and during my experience I have witnessed some really wonderful developments. You can never tell what will come out of the most unlikely personality, and I know of a number of cases where parties have developed into very clever business men and engineers who would probably have remained very low on the ladder had they been tied down by rules and restrictions. It is well to encourage students, apprentices and young people in general, but I would never feel satisfied in bringing an inexperienced student into my ofice and putting him up against certain rules and regulations, leaving him to work out quantities and figures entirely by such stipulations.

To my mind the important point is that you must adapt the abilities of the various members of your staff to the various classes of work in hand, and as they develop put them up against more important propositions.

Yours truly,
R. M. ROY,
(Manager Hamilton Bridge Works Co., Ltd.)

A Standard Guarantee for Street Paving Contracts

THE Association for Standardizing Paving Specifications, at its recent annual convention in New Orleans, adopted a standard form of maintenance guarantee for street-paving contracts. As many city engineers are required by the city authorities to draw paving contracts accompanied by a certain number of years' guarantee, there is no particular objection to the preparation of the standard form. As one critically reads this guarantee, however, the strongest impression made is that the best kind of guarantee is no guarantee at all, says The Engineering News, commenting editorially. The guarantee recites that at the end of five years from the time the roadway is opened for traffic, "the pavement shall be in good, serviceable condition and free from defects that will impair its usefulness as a roadway, ordinary wear and tear excepted." Who is able to draw with certainty that fine hair line which marks the boundary between "a defect that impairs usefulness as a roadway" and ordinary wear and tear? How broad and how deep must a depression in the pavement be to be classed as a "defect?" It is a comparatively easy task for an engineer to say whether a newly laid pavement is built in a first-class manner and in accordance with specifications; but to attempt to reduce to definable terms the condition in which a street pavement subjected to heavy traffic must be in after five years of use—that seems to us like attempting the impossible.

In order to make the guarantee in any way workable, it has to be hedged about with particulars as to openings made through the pavements, the building of street-railway tracks in the street, etc. It is necessary furthermore that the contractor or some substitute shall practically live with the pavement during the five-year period and undertake all repairs and replacements made necessary by street excavation.

It is our opinion, and we believe it is the opinion of all progressive engineers in charge of street-paving work, that this is the wrong way and the most expensive way to take care of a city street. The way to have paving laid at the lowest cost is to provide a first-class specification, compel the contractor to live up to it, and when the pavement is laid, pay him his money in full.

When All Were for the State

The progress of the good roads movement in Ancient Rome inspires a writer in Good Roads to indite the following:

"When Caesar took a westward ride and grabbed the Gauls for Rome, what was the first thing that he did to make them feel at home? Did he increase the people's loads and liberty forbid? No, he dug in and built Good Roads—that's what old Caesar did. Did Caesar put the iron heel upon the foeman's breast, or did he try to make them feel the Roman rule was best? What did he do to make them glad he'd come their midst amid? He built Good Roads in place of bad—that's what old Caesar did. He built Good Roads from hill to hill, Good Roads from vale to vale; he ran a Good Roads movement till old Rome was strong and hale. He told the folks to buy at home, built roads their hills amid, until all roads led up to Rome—that's what old Caesar did. If any town would make the town the center of the map, where folks will come and settle down and live in plenty's lap, if any town its own abodes of poverty would rid, let it get out and build Good Roads—just like old Caesar did."

Faience, Tiles and Other Glazed Materials

The term faience is now used to represent all architectural glazed ware, other glazed bricks and sanitary goods, which of recent years have come into extended use, says the National Builder. Glazed surfaces are of course, hygienic and reflect light. In towns glazed ware is most suitable; it reflects the much needed light, and keeps clean, what little dirt that does collect being easily washed off. Furthermore, it affords means for adding the much needed relief of gorgeous color to the streets. For interior work, of course, colored tiles have been used from time immemorial. Glazed terra cotta and wall tilings are now frequently combined, with very beautiful and effective results. They possess the great advantage over all other decorative methods in that the only cleaning they ever require is wiping over with a damp cloth. Under fair conditions, both are practically imperishable, except by effects of fire. Faience is manufactured of the same materials as ordinary glazed tiles, but it must otherwise be treated exactly the same as terra cotta. Shrinkage must be allowed for in working details. The glory of a tile is its color, and the pattern is comparatively unimportant, except as a peg to hang the color on. The pattern should therefore be conventional. The design of colors can only roughly be suggested in a drawing, for the conditions of manufacture so vary that it is almost impossible to get the exact same tint. Dead flat colors should be avoided as they look too machine made. It is natural for one glaze to run slightly into another on a flat surface in firing, and this gradation of color forms a distinctive and most beautiful feature.

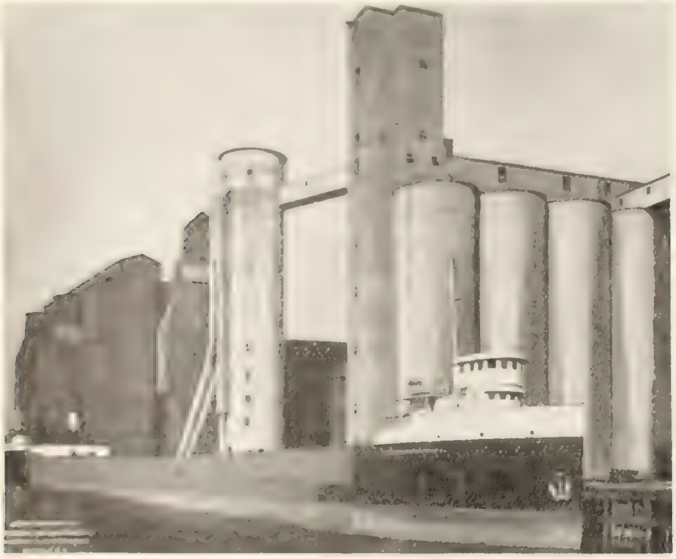
Reinforced concrete tanks for water and concentrates have been built in large numbers in connection with a new concentrator for the Mactezuma Copper Company, Nacozari, Sonora, Mex., and it is reported that they are proving water-tight, except a little sweating around a few of the pipe connections in the tank bottoms. According to information collected by the committe on water service of the American Railway Engineering Association and presented in its recent report, 128 of these tanks of 10,000 gal. capacity each have been built at the plant. They are 12 ft. in diameter and 12 ft. high. The form was erected complete and each tank was poured in one operation, thereby eliminating joints in the shell, which is 6 in. thick. The bottom is 12 in. thick. A very rich concrete was used. All of the stone would pass through a screen having ¼-in. mesh. The steel in the shell is stressed 11,400 lb. per square inch, not considering the tensile strength of the concrete. At the bottom of the tank the concrete in the shell is stressed only 63 lb. per square inch without assistance from the steel. The concrete in these tanks can carry that stress without breaking, the committee report observes, and consequently the stress is believed to be divided between the steel and the concrete so that the unit stress is very low. The vertical reinforcement of the shell consists of ¼-in. rods spaced 12 in. center to center.

A Cylindrical Concrete Tower at Buffalo

Innovations in Design and Construction—Elimination of Heavy Foundation Walls—Continuous Pouring of Concrete—Mechanical Equipment

Special to the Contract Record and Engineering Review

THE new marine tower, built by Messrs. James Stewart & Company, Chicago, for the Washburn-Crosby Company, Buffalo, presents many new features of interest. In efficiency of operation and in details of design, it is unsurpassed in structures of its kind. In brief it may be described as a cylindrical tower of concrete resting on a heavy concrete slab supported on piles. In constructing the footing 224 piles were driven and these were cut off at low water level. In three tiers on the landward side anchor piles were placed. These were reinforced with double rows of pile deadmen, which also served to align the three foot bulkhead of 3 x 12 in. plank supplied to give additional anchorage. A mattress of concrete three feet thick was built on top of the piling. This was roughly octagonal in shape, about thirty-six feet in greatest diameter. About four inches below the surface of the mattress were placed two tiers of ⅞-in. steel bars spaced 6-in. centres. These were laid at right angles to each other and extended the full width of the slab. Short bars were laid rapidly at the bottom of the mattress and completed the foundation reinforcement.



Frontier Elevator and Mill, Buffalo, N.Y.

An innovation in design, which is worthy of note was the elimination of heavy foundation walls by beginning the tower walls directly on the mattress. As the first floor rests on a cinder fill and no additional loads are introduced at this point, it was possible to dispense with the customary thickening of the walls below ground. This served a double purpose. It made a material reduction in cost by saving lumber and labor, since the forms which were used for the walls above were utilized here also and it afforded an excellent platform on which to erect the movable forms and set the jacking apparatus in place.

The type of form and the method of operation were those employed by James Stewart & Company in their grain elevator work. An 8-inch annular space was formed by building four feet walls of 2 x 4 in. staves slightly beveled. These were held in position by four built up rings made from 2 x 8 in. lumber sawed to the proper radius. The straight partition cross walls were similarly taken care of, provisions being made for pilasters and columns. Expansion joints to give ease of operation were formed at various points. On the structure thus constructed was built a working platform supported on strong trussed girders and joints. No alterations or additional forms were necessary for the walls throughout their one hundred and sixty feet of height.

Jacks and steel yokes, the invention of Messrs. W. R. Sinks and R. H. Folwell, were used to raise the forms. These are an ingenious device by which it is possible to make the pouring of concrete a continuance operation, governed only by the speed of setting of the concrete. The yokes are built up of steel channels and plates and are bolted to the forms. The jacks which operate vertically in either direction are built to clutch one inch rods, which become a part of the reinforcing. On them the forms are made to climb. The jacks have a small capstan head in which turning bars are inserted. By turning in one direction the jacks are made to climb on the rods and by reversing the direction of turning the form is raised. One of the advantages of this type of jack is that by reason of the jacking rod passing through the jack on its vertical axis the load of the form and working platform is applied concentrically, thus preventing any tendency of the form to bind or get out of plumb. The operation of the form is not delayed while placing new jack rods since these may be inserted at the top of the jack when desired without as much as loosening a nut. By means of a series of marks on

Placing of Rods and Form Work

the rods the work of placing the horizontal reinforcing accurately and quickly is facilitated, and the daily progress readily noted. The forms and jacking apparatus being in place on the foundation slab, concreting was commenced on the walls and proceeded without interruption throughout the entire height. The floors, of which there were eight, were formed and poured separately after the movable forms had passed upward and some of them were in place before the walls were completed. Box forms had been placed in the walls at the proper length to receive the girders, so that when the floors were constructed a good bond was obtained between them and the walls. All the floors were concrete slabs with supporting girders where necessary. The reinforcing steel consisted of ¾-inch round rods conforming to the standard specifications for medium steel bars. The floors were divided into six bays, by the interior cross walls, two of which ran from front to back of the tower symmetrically placed 6 feet from the centre line, and the third was on the centre line at right angles to these. Between the third and seventh storeys the floors in the front bay were cut out to make room for the marine leg and in all floors, openings were formed to accommodate power drives, leg, scales and other parts of the equipment. As the floors were completed a cement finish one inch in thickness was applied and this was trowelled to a smooth even surface.

Receiving Tower nearing completion

The construction of the roof is interesting. The roof consists of a concrete slab 4 inches in thickness and slightly conical in form. Concentric rings of ½-inch rods spaced at 13-inch centres and ½-inch bars radiating from the peak of the roof formed the reinforcing. A concrete cornice finishing flush with the roof completed the structure. No roofing coat of any kind was used. The concrete being rendered impervious to moisture by a waterproofing compound. All concrete in the tower was 1-2-4 mixture of Portland cement and gravel with the proper proportion of sand to give a dense mixture. A batch mixer was used and the concrete was hoisted by means of a wooden hoist tower securely anchored to the tower.

To connect the tower with the storage elevator a steel bridge from the seventh floor was built to elevator C, which was one of the existing buildings. The bridge was 8 feet high and 9 feet between trusses. The floor and roof were reinforced concrete and the bridge was enclosed with "Ferroinclave" plastered with cement mortar.

In describing the mechanical equipment of the tower it may be well to follow the course of the grain from boat to elevator. When a boat to be unloaded is tied up at the dock, the marine leg is lowered through one of the vessel's hatchways into the hold. This leg is equipped with a 26-in. 7-ply belt having two rows of 8-in. x 8-in. x 12-in. buckets spaced at 12-inch centres. The leg casing is made of 3/16-inch plate with angle bracing to give the necessary rigidity. From centre to centre of head and boot pulleys is 95 feet. To raise and lower the leg a hoisting drum with brake band attachment is used and a pusher arm gives lateral control. A 75 h.p. direct geared motor to operate the leg is mounted on a steel cross head thus obviating complex rope drives. The leg has a capacity of 22,000 bushels per hour. A steel framed hood enclosed with "Ferroinclave" plastered with cement mortar houses the leg. Operating in conjunction with the leg are four ship shovels. The shovel drums are 24 inches long and 20 inches in diameter and are driven by means of paper friction wheels. Eccentric boxes are provided on a countershaft to operate the drums, and these are controlled by operators on deck by means of lines extending to the eccentric box levers. With the marine leg in operation, grain is elevated and discharged into a receiving hopper of approximately 800 bushel capacity. To prevent grain from leaking from the receiving hopper and to confine the dust a rubber curtain is provided. To accommodate the leg in its various positions the curtain is connected to counterbalanced drums on which it winds.

From the receiving hopper, grain is discharged to a 300-bushel hopper scale immediately below. The scale has an automatic drop bottom to secure rapid discharge. Having been weighed the grain is dropped into an 800-bushel hopper below and from there it may be discharged through spouts to either the conveyor belt in the dock gallery running to elevator C or it may be directed by means of slides to the lofter leg within the tower. The lofter leg belt is a 36-in. six-ply belt with two rows of 8-in. x 8-in. x 18-in. buckets at 13-inch centres. If the grain is elevated in the tower it is discharged onto a 42-inch belt conveyor running through the bridge and discharging into the tanks of elevator C. To drive these two belts a 100 h.p. motor is installed on the eighth floor of the tower.

Precautions against accident have been taken by providing cutout switches on the dock so that any part of the machinery may be stopped from that place and the machinery is so designed that it can all be controlled from the third floor where the operator has a good view of the work.

Patches on concrete surfaces are lightened to make their color the same as the original work by adding a small quantity of lime paste, in making repairs on the masonry of the Illinois Central Railroad, according to an account furnished by Mr. F. L. Thompson, engineer of bridges of that road, to the committee on masonry of the American Railway Engineering Association. The mortar used in patching has the same proportions of cement and sand as the original concrete and is applied stiff.

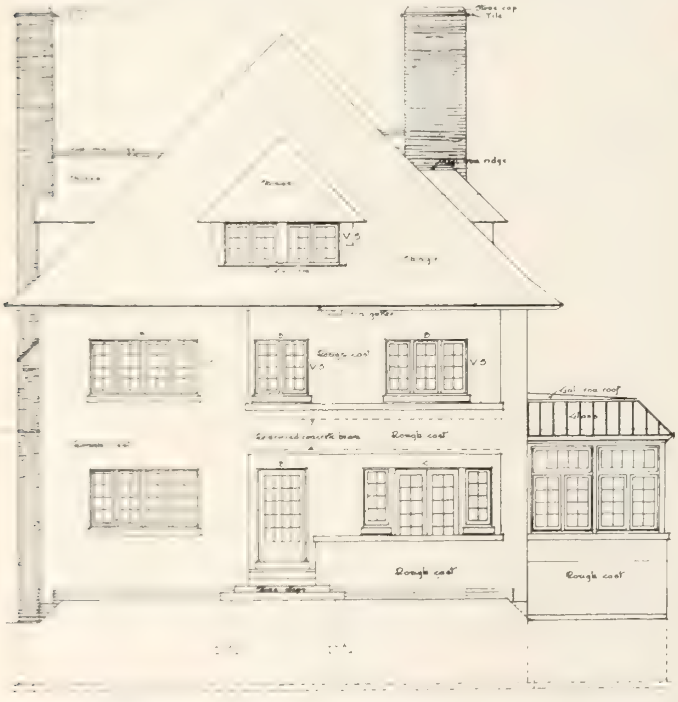
Hollow Tile for Residence Building

The Advantages of this Type of Construction as Illustrated by an Attractive Residence on Russell Hill Road, Toronto

It is only within recent years that hollow building tile has come into its own among architects, builders and house owners as a material from which to construct the walls of residences and similar buildings. During the year 1907 the first concerted move to use this material for house construction was made in and around New York City. From this beginning, its use increased rapidly particularly in the eastern section of the United States. It is rather curious to note that this material should not have come into general use for house work at a much earlier date, but the present indications are that we are coming to a Hollow Tile house era in America, in which this clay product will enter largely into the construction of fireproof and semi-fireproof residences.

Of the many advantages of the use of hollow tile for houses, the foremost is the fact that the cells of the tile form a complete blanket of dead air insulation about the house, protecting the interior temperature from any sudden atmospheric changes, such as are experienced in Canada, making the house cool in summer and warm in winter. Other good points are that the building is damp-proof, vermin and rat-proof, and that it gives immunity from unsightly shrinkage cracks such as are often seen in the plaster of many houses of ordinary construction.

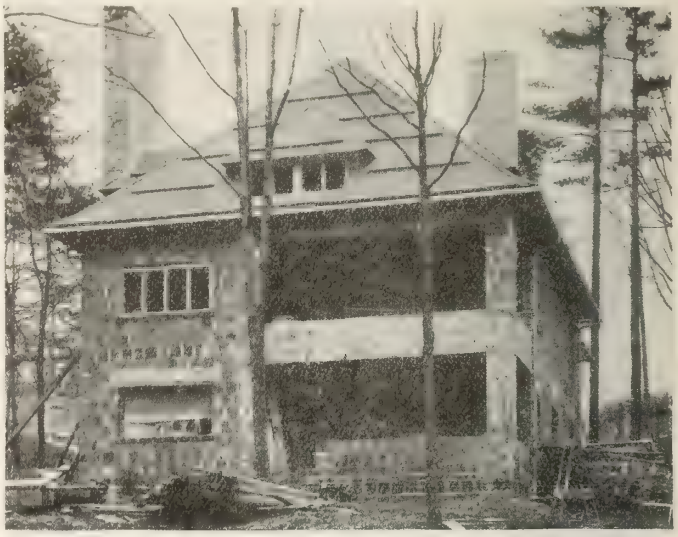
Terra cotta hollow tile is adaptable to any architectural design, and as the outside is coated with stucco or veneered with brick a house of very pleasing appearance can readily be secured. The interior plaster is applied directly to the tile, no strapping or lathing being necessary.



South Elevation of residence on Russell Hill Road, Toronto

If an entirely fireproof house is desired, the use of long span combination floor slabs carried on tile walls, secures a sound-proof and fireproof floor and by using Hollow Tile for the partitions and roof, the maximum protection against fire is secured.

With a view to establishing a precedent for this type of house in Canada, permission was secured from City Architect McCallum by Messrs. Eden Smith & Sons, architects, to erect a terra cotta hollow tile house on Russell Hill Road, Toronto, for a client who was familiar with the advantages of this construction. As the present Toronto Building Code contains no provision for this type of residence, the work was carried on subject to the approval of the City Architect. Upon completion of the erection of the building, tests were made by the City Architect's Department and the results being entirely satisfactory, provisions are being made in the revised building code for houses of this type.



General view of construction at a recent stage

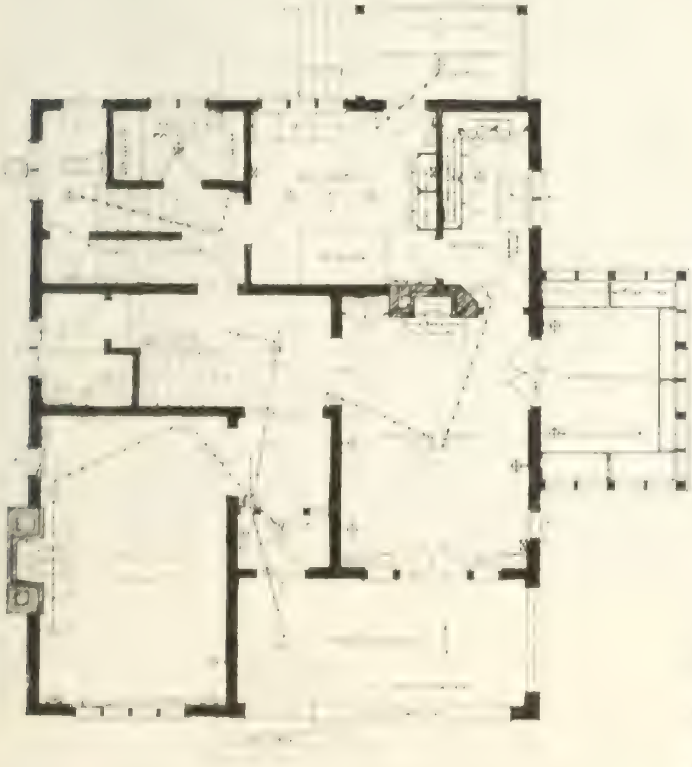
The residence mentioned is a two and one-half storey ten-roomed house, with two baths and a conservatory. On the plan the house measures 36 x 43½ feet. The house is of fireproof construction throughout except for the roof and the partitions in the attic, which are of ordinary frame construction.

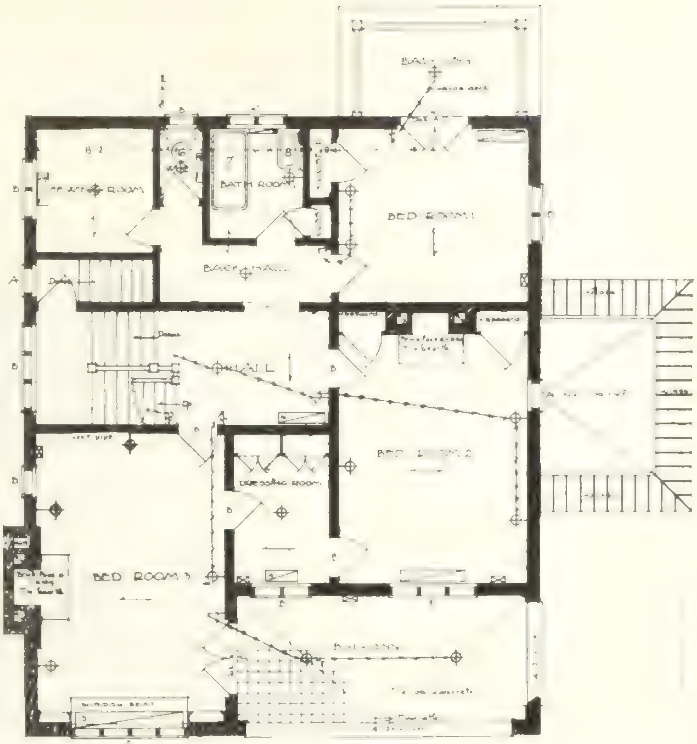
The walls are of Natco Hollow Tile on concrete footings, set vertically, 12 in. tile being used for the outside basement and interior bearing walls to the ground floor line, 10 in. from the ground floor to the first floor line and 8 in. from that floor to the roof

An earlier view showing walls up to the ground floor line. All partitions below attic floor other than bearing walls are of four-inch partition block, set vertically. All openings in outside walls and bearing walls are spanned by reinforced concrete lintels, faced on both sides with two-inch partition blocks to secure insulation against frost. Window sills are of four-inch blocks laid on their sides, extending three inches outside of walls and given a slight tilt to carry off water. The upper balcony floor and the attic floor are carried by reinforced concrete beams faced with 2 in. partition tile which in turn are carried by the walls of the building and a reinforced tile column at the south-east corner of the building. This column is built of hollow tile with cells filled with 1:2:4 concrete, and the necessary reinforcing steel is run through the tile before filling. Outside walls have their exterior surfaces plastered with cement mortar below brick watertable at grade line and then mopped with pitch for waterproofing. No damp course is required.

Pouring combination slabs for ground floor

The floors throughout the entire building are of long span combination, using four-inch hollow tile with 2 in. of top concrete and five inch concrete ribs reinforced with two five-eights square twisted steel rods. This floor is designed for a live load of 50 lbs. on a 13 ft. span. Under a test load of 290 lbs. per square foot it showed a deflection of one-eighth of an inch at the end of 20 hours and resumed its former position when the load was removed.


Ground floor plan



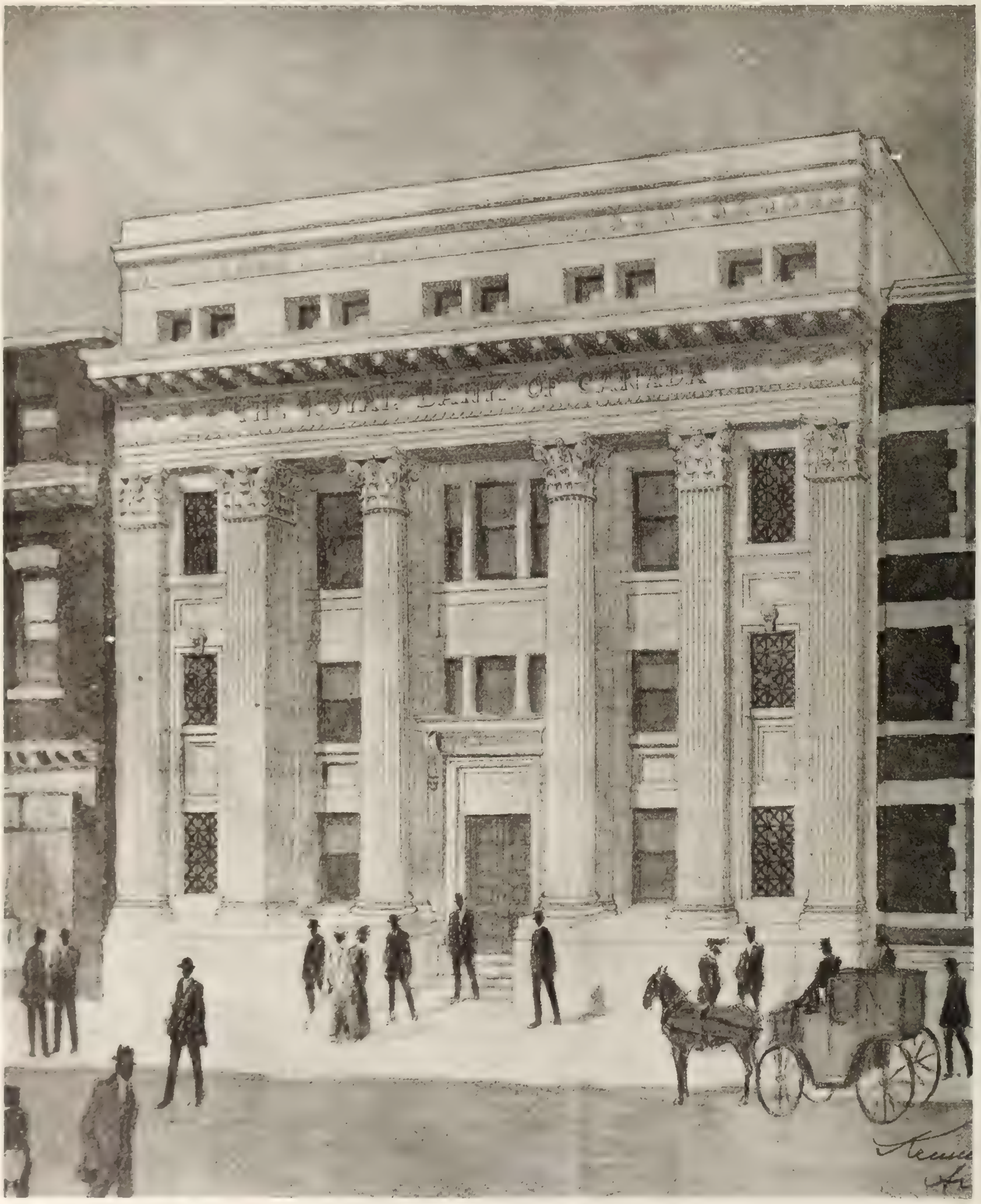
First floor plan

Piping for plumbing and steam heating is concealed in the tile partitions, as also are the conduits for electric wiring. Wherever necessary for plaster grounds and trim, nailing plugs were inserted in the joints by the masons when laying up the walls. All bath rooms and toilet rooms and kitchen are to have tile floors and wainscotting. Owing to the rigidity of the walls and floors, perfect sanitary conditions are secured in these rooms as the tile will not break loose or develop cracks in the corners.

Work progressing under severe winter conditions

The cost of hollow tile walls with stucco is the same as that of brick. The cost of fireproof floors and partitions in this house was $742 more than that of ordinary construction. This extra expenditure is less than seven per cent. of the total cost of the house.

Proposed Royal Bank of Canada, Edmonton, Alta.


THE ROYAL BANK OF CANADA

Architect—Mr. Kenneth G. Rea, Montreal

Contractors—Messrs. Purdy & Henderson, Vancouver

Royal Bank of Canada, Edmonton

DESIGNED by Mr. G. Kenneth Rea, architect, Montreal, this building will replace the old structure of the Royal Bank of Canada, Edmonton. The site is 50x75 ft. The front will be of granite, and the other walls brick with hollow terra cotta lining. The ground floor—with the ceiling 20 feet high—is to be occupied by the bank, and the remainder of the building will consist of offices and quarters for the janitor, the whole of the interior being finished in oak. The bank will be fireproof and will be fitted with fireproof doors and windows. There are to be steel-lined vaults. The contractors are Messrs. Purdy and Henderson, of Vancouver and New York.

Mixing and Placing Concrete for Floors

THE methods and plant employed for mixing and placing concrete for the floors of the Rand McNally Building, Chicago, as described by Engineering & Contracting, are noteworthy:

The Rand-McNally building is ten storeys high and covers an area of 150 x 290 feet. In the center of the building there is an open court 32 x 128 feet. Access to this court is had at each end from the alley way which is to be maintained through the center of the building.

Mixing Concrete.—Advantage was taken of this court space to locate the materials, hoists, mixing plant, and bins. The basement of the building will run under the court, therefore the court was temporarily floored so that teams could drive in from the alley level and deliver the building materials. At each side of the court a mixing plant and hoist tower are located. The material bins are built so that their tops are at the level of the floor of the court. Wagons are driven over gratings which cover the bins. The grating over one bin consists of 3 x 12 in. plank set 2 ins. apart on edge. Over the other bin 2 x 12 in. plank have been used, but they have worn so badly that it is doubtful if they will last to complete the work. The contractors will hereafter use 3 x 12 in plank for gratings.

The bins are hopper shaped, with two compartments sloping toward their respective gates, which are side by side over the mixer hopper. The bins are built of 3 x 12 in. plank laid on sloping stringers of the same size, and the whole structure is supported and tied to the steel structure, which will ultimately carry the permanent floor of the court. The gates are of the sliding type, operating up and down by means of a simple lever arm. The hopper is an affair similar in shape to the bin itself. It is divided into two compartments, one for sand and one for gravel. The compartments are proportional in capacity to suit a 1:2:4 mixture, which is the one most commonly used in the work. The hopper is discharged into a ¾ cu. yd. mixer. On one side a McKelvey mixer is used and on the other a Chicago mixer. The cement is dumped through chutes in the court platform, which carry it to storage piles in the basement adjacent to the bins. It is taken from these piles as needed and wheeled in barrows to the man at the mixer hopper.

The mixer is discharged into a bucket which operates in the concrete hoist tower and is hoisted to any point desired where a hopper is hung on the side of the tower and the hoist bucket is discharged into it. From this receiving hopper a short chute is arranged for discharging the concrete into two-wheeled carts.

The force required to mix and hoist the concrete is about as follows: Two men operating sand and gravel gates and dumping bags of cement into hopper; 1 signal man; 1 hoist engineer; 2 men hauling cement in barrows; 1 man at top discharging hopper into carts; 1 man at end of chute cleaning up drippings and keeping men with carts moving, and 1 mixing plant foreman. During cold weather the material on arrival is generally frozen in lumps and an extra man is required to break it up so that it will go through the gratings into the bins. Another man is also required underneath the bins at such times, to help make the materials flow out of the bins and at other odd jobs which may come up. The bin bottoms are at an angle of about 45 deg., but they nevertheless become clogged at times when the materials are wet. Perforated steam coils are placed within the bins to prevent the freezing of the materials and hot water is supplied for the mixing.

The amount of concrete run by the two plants in an 8-hour day has been as high as 650 cu. yds. on days when everything ran well on the mixing plant and the men up at the top were able to provide a place to receive it. During bad and cold weather, however, a run of 250 batches per machine is considered a good average for an 8-hour day. This would be about 375 cu. yds.

Placing Concrete.—The concrete is used for floors and for encasing the structural steel beams and columns. The beam forms are suspended from the steel beams and the column form are built square so that in all cases there will be at least two inches of concrete covering the structural steel. The forms for the floor slabs are supported by the beam forms by means of resting the 2 x 4 in. stringers across the panel between beam forms. The lagging consists of 1 in. boards. These slab forms are braced underneath with light posts supported on the next lower floor. The reinforcing consists of ⅝-in. square twisted bars on 6-in. centers, running across the 16-ft. panels and ½-in. bars on 3-ft. centers running both ways. The floor slab is 10⅝ ins. thick. The reinforcing is placed by two gangs of men working about 4 men, each ahead of each gang placing concrete. The steel is laid in and wired together to hold it in place. To keep it above the forms small pieces of V-shaped sheet steel are used. These are laid under the reinforcing at several points, raising it the required height above the forms. To keep men from walking or wheeling over the reinforcing steel, runways are provided. These consist of built-up sections which are supported on wooden horses aboue 1 ft. high. The built up sections are about 16 ft. long and consist of three 2 x 6-in. stringers laid flat and covered with 1 x 6-in. boards nailed across them. When new they easily support the two-wheeled carts containing about 2 cu. ft. of concrete without much deflection under the load. When they become older and are weakened by rough handling an extra wooden horse is used to divide the span. In the Rand-McNally building, the floor area surrounds the central court and the method of transporting the concrete from the hoist towers to the forms is normally as follows. A double runway encircles the court about half way between the court wall and the outside wall of the building. A double runway runs out to the circular runway from the hoist tower. Concreting is commenced at the far-these points from the hoist tower and branch runways are extended from the main runways to the outside areas. These branches are moved about as needed and are usually placed about 12 to 16 ft. apart so that a cross runway can be laid to join two of them at the extreme end. In this way the carts can be run in one direction, that is, can come out on one branch runway, dump where desired, and then go back by crossing over to the end of the next branch runway and back to the main double runway to the hoist tower.

For this building seven wheelers are employed to carry cement to the farthest points from each tower, about 225 ft. At the point where concrete is dumped there is 1 foreman, 1 man cleaning the forms ahead of the concrete, 2 men spading beams or ramming columns with long sticks about 1 in. square, 2 men spreading and changing branch runways, and 1 man following with a wood float for surfacing. In case snow and ice have accumulated in the beams and columns this is done away with by means of a steam jet handled by one man. The general contractor is the Wells Bros. Company, of Chicago.

Commercial Travellers' Building, Calgary

A photograph of the proposed Commercial Travellers' Building at Calgary is reproduced herewith by courtesy of the architects. The structure will be 60 by 100 feet in dimensions and will be built of reinforced concrete. The basement will be utilized for an up-to-date cafe. The ground floor will be occupied by a wholesale firm and there will be two flats of offices. The Commercial Travellers' Club will occupy one floor and on the top there will be an Assembly Hall the full size of the building. The architects are Messrs. Burroughs & Richards.

Commercial Travellers' Building, Calgary

At Santpoort, in Holland, the first house of two storeys, built of concrete, on the Edison system, has been erected. The builders set up moulds, having the appearance of caissons, as high as the first floor. The cement was then poured into the moulds. When time had been allowed for the cement to harden, the mould was removed and the same process followed for the second storey. In one month the house was finished, and it is claimed that building in this way costs about one-half of the sum that would be expended on a house put up in the ordinary way. One of the largest buildings ever constructed of concrete is in Buffalo. It has a height of ten storeys, a length of 588 feet, and a width of 109 feet.

New Fire Station for Westmount

A new fire station, to be known as No. 2, has been constructed for the city of Westmount, from plans prepared by Mr. Archibald Currie, the city engineer. It is situated at the corner of Victoria avenue and Westmount Boulevard, and commands a view all over Montreal's finest suburb. The building consists of a basement and two storeys, and is constructed of reinforced concrete up to the window sills of the ground floor, and of pressed brick for the remaining portion. The interior walls are of 6 in. cavity air space cement plaster. On the ground floor, accommodation is made for the fire-fighting apparatus and also for eight horses; an arrangement of chains, provided in the stalls, is under the control of the watchman, who is able to release the chains and allow the horses to take their place under the suspended harness. The watch-tower is in the northeast corner, on the ground floor, and from this place the lighting of the building is controlled. The floor is of reinforced concrete, while the ceiling is constructed of the same material (with steel beams), panelled and moulded. The front doors are of solid oak, and like all the others, are of the swing description.

Proposed Fire Station, Westmount, Que.

On the ground floor there are sliding poles, and at the rear the entrance to the hose tower is placed. The tower extends right through the building to several feet above the roof, and is intended for drying the hose. A new feature in fire-stations are the steel plates built in the concrete floor on which the apparatus runs to the entrance. These plates are removable, and underneath are fitted a series of rollers. The plates are used in the summer, and the rollers in the winter, when sleighs are placed on the fire machines.

The first floor, reached by a spiral staircase, provides accommodation for the men. This includes a library, sub-chief's office, recreation room, dormitories, kitchen, luncheon room, lavatories, baths, and a suite of six living rooms for the sub-chief. All the rooms are well lighted, and nicely finished, a feature being a cosy corner with a picturesque fire-place. The roof is of 6 in. reinforced concrete. The towers and marquise are finished with tiles.

The basement will be utilized for storage, heating apparatus, work-shop, coal bins, and in a separate compartment, the gasoline tank. The electrical wires are placed underground to prevent damage by the weather. All the work has been done by the council workmen under the supervision of Mr. Currie.

Veneered Brick Construction

THERE are some good and some bad features about veneered brickwork on houses, but the bad features can be entirely eliminated by the proper construction of the work in all its details, writes B. F. Young in the National Builder.

On concrete buildings, this is an economical finish, as it is very expensive to make and set forms to get a good smooth finish on the exterior of the building. On frame houses, this method is also economical, in that the completed structure has the appearance of a brick house at a greatly reduced cost.

In veneering a frame house the framework should be sheathed with either lap joint or tongue and grooved sheathing, jointed and well nailed on every bearing, to make a tight job and substantial fastenings for the anchors of the brick. After sheathing, the building should be covered with a good grade of tar paper (waterproof), well lapped, because every precaution should be taken to protect the sheathing from leaks and dampness. In setting the window frames, we come in contact with the principal part of our work, and the cause of many of the evils of veneered brickwork. Too much care cannot be taken in having the window and door frames properly tinned and flashed. The bottom of the window sills should be grooved about three-quarters of an inch deep on the sheathing line or back edge of the casing, to admit of a tin or copper pan being inserted up into the same, and then the pan should be wide enough to extend out over the edge of the brick about one-eighth or one-quarter of an inch, to prevent the water from driving under the sill. This is not absolutely essential where the brickwork runs to the ground, but in case brick are carried on a girder spanning a room below a roof adjoining the same it is then desirable to throw off the water from each individual window and prevent it from running down between the brick and the tar paper. For detail see Fig. 1.

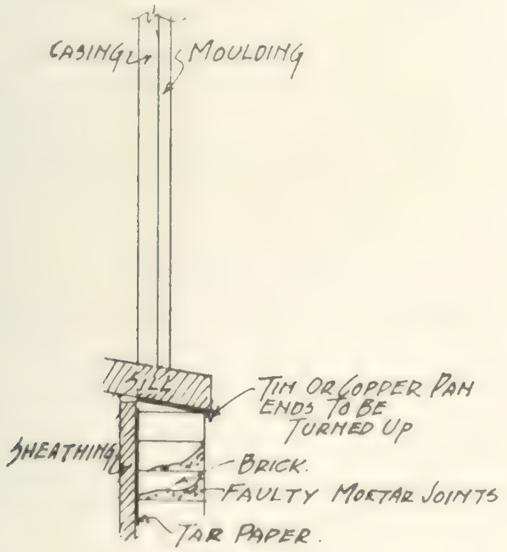


Fig. 1

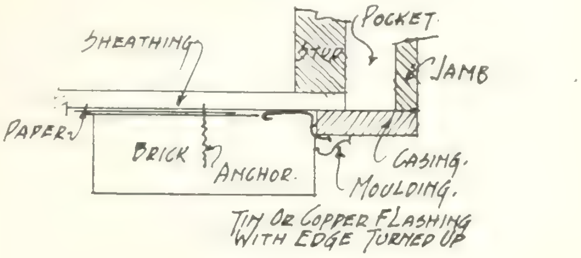


Fig. 2

On the sides of the window frames the flashings should come under the outside case moulding, and then be bent back against the sheathing, the outer edge being bent or turned over on itself about a quarter of an inch, not flattened out, but left a little open so that the water in running down and flashing cannot spread out, but will be guided down to the sill pan below, and carried out beyond the fact of the brickwork. See detail Fig. 2.

The tar paper should by all means be neatly lapped down over the window cap to prevent any leaks from gaining access through the head of the window frames, and on the sides of the windows the paper should be under the side flashings of the window casings.

I think I have covered all the principal details that can be mentioned regarding the carpenter and tinner, and the rest is now up to the bricklayer to lay up a tight wall, properly anchored to the sheathing, and resting on a good solid foundation. A water-tight or pressed brick is preferable to any of the soft porous brick. A great many leaks come through faultily laid brickwork, the joints between the ends not being properly mortared, which leaves the top of the joint with a thin point of mortar and is easily accessible to the elements of nature and is the cause of many bad leaks. See detail Fig. 1.

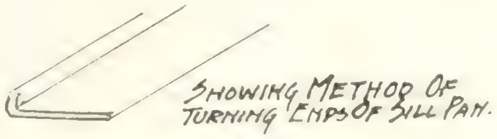


Fig. 3

I was called upon recently to inspect a brick veneered building for leaks, which had cost many dollars for needless carpenter and tinsmith bills. The worst thing about this building was that the brickwork came down on a girder spanning the rear of a storeroom, the rest of the rear being tin roofed.

The water always leaked through this girder into the room below. I came to the conclusion that there was either no tar paper on the buildings, or the tin roof did not come up under the brickwork and tar paper. Now to repair this properly was an expensive job, so I set out to find how the leaks came behind the brick, which I soon found undoubtedly came through defective mortar joints, which had opened up at the top edge of the joint between the ends of the brick. The brick were repointed, and the treatment has apparently fixed the leak.

Organization in the Brick Plant*

By J. S. McCannell

ORGANIZATION applies to a brick plant as well as to any other business. Every large manufacturing concern has been built up by men who recognized the value of system in their work. No person can hope to succeed in business unless he has some definite plan or system by which he can tell at stated times where he stands. The brick business is no exception and unless one has some means of telling whether there are leaks or not, it may not be long before there is a balance on the wrong side.

Mr. J. S. McCannell

We recently read of a case where a business was going behind. The men were all hard working and successful in other lines of life. An outsider was called in who looked over the ground. After a careful investigation, his conclusion was that the responsibilities of the place were resting on too few shoulders. One or two men were carrying the whole load. The younger men in the place were called in. Responsibilities were divided up. The huge departments were divided into smaller units with the result that the place took on new life, and what looked like a black proposition was now a live business, with lots of young life and ambition being developed.

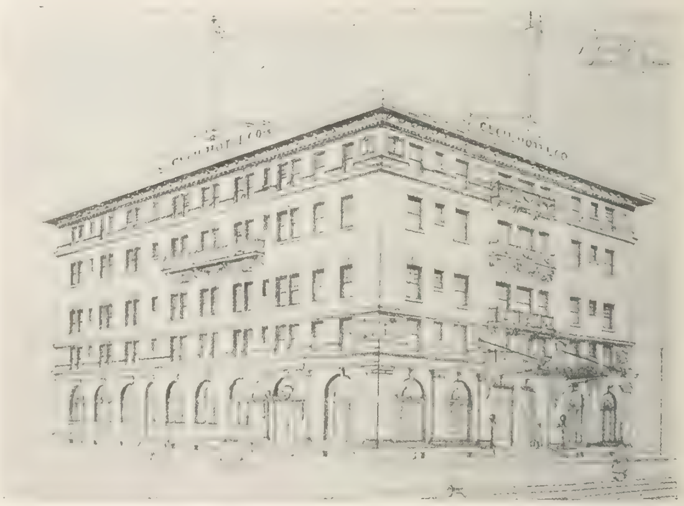
The unit system may be applied to the brick business with good results. Divide the plant up into departments. Put a good man at the head of each unit and hold him responsible. In this way if anything goes wrong the responsibility can easily be fixed. The head of the department will take more interest in seeing that things are going smoothly, and if the right class will develop into a more useful man. All the departments must work together and be responsible to the head superintendent. In this way track may be kept of the cost of production in each department. No business can afford to guess what their goods cost them. Many a good business has gone to the wall through lack of knowing what it cost to produce their grades.

Men are frequently put at a class of work for which they are not fitted, with the result that they do not make good. In many cases if the head of the department would see just where a man fails and move him around, a man would fit in some other place and turn out to be a useful workman. Men should be encouraged to take an interest in their work, and also to make any suggestion that will improve the service. Some firms do this by offering rewards for ideas that will be of use.

The great object is to keep the factory going steady up to its normal capacity. Different schemes may be tried and no one plan will apply to all plants or different products. Day work may be necessary and all right for some plants. In most cases if day work is adopted the workman does not particularly care if things go right or wrong. When he is on piece work the man's attitude is changed. It is now his business to see that there are no stops or delays. If any men loaf in the gang the men will call attention to it, and will insist that they do their share or get out. What was nobody's business is now of interest to all. To get desired results the amount earned by the men must be fair. A good man must be kept in the plant, and any system that will keep a man satisfied and contented is the one that should be adopted.

New Hotel for Hamilton

The accompanying illustration is a perspective view of the proposed Cecil Hotel at Hamilton, Ont. This building will be 90 x 100 feet in dimensions. It will have five storeys and basement and will contain in all about 160 rooms. Steel construction will be employed and the building will be fireproof throughout. The floors and partitions will be of hollow tile. Red pressed brick with light colored stone or terra cotta trimmings will be used for the exterior. The building will be replete with all modern conveniences and will be well lighted, ventilated and steam heated. The architect is Mr. J. A. Armes, 68 Federal Life Building, Hamilton.



Proposed Cecil Hotel, Hamilton

Canada's fire losses last month are estimated at $2,261,414, as compared with $852,380 for the corresponding month last year. The fire loss for the year to date amounts to nearly $6,000,000, as compared with $4,043,975 for the first three months of 1911.

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*Before the Canadian Clay Products Manufacturers' Association.

Tables for Reinforced Slab Design*

Data for Calculating Span Lengths and Reinforcement for Concrete Slabs of Varying Thickness and Loads

THERE is frequently occasion for a builder to furnish a reinforced concrete floor over a boiler room, or to furnish a small slab of reinforced concrete under a fireplace or in some other portion of a building that is not otherwise fireproofed. With the frequent use of reinforced concrete in some portions of buildings of all classes, the builder and others concerned should be able to decide with the least amount of labor the thickness of concrete and the amount of reinforcing necessary for any given load that is desired to carry for any given span.

We give below several tables that have been found convenient in actual practice. As round rods are usually the most easily obtainable of any kind of reinforcement, the tables are based on the use of such rods. They may be of wrought iron, though medium steel rods are to be preferred. It is desirable that the size of the rod be kept down to 3/8 in. diameter or to ½ in. diameter for ordinary thicknesses of slab, as this insures enough concrete properly to develop the strength of the rod by the gripping action of the concrete, usually called the "skin friction." It is better to have these comparatively small-sized rods occurring at close intervals, than larger rods further apart.

TABLE I

For use where the slabs are by themselves, and not connected with reinforced concrete of adjoining spans.

Reinforcement, ⅜" round rods on 6" centers

[illegible] Clear Span

Live load per sq. ft.	3½"	4"	4½"	5"	5½"	6"
70 lbs.	6' 2"	7' 0"	7' 6"	7' 11"	8' 3"	8' 7
100 lbs.	5' 8"	6' 6"	7' 1"	7' 6"	7' 10"	8' 2"
120 lbs.	5' 3"	6' 1"	6' 7"	7' 0"	7' 3"	7' 7"
[illegible] lbs.	[illegible]	5' [illegible]	[illegible] 11"	[illegible]	[illegible] 7"	6' 11"
200 lbs.	4' 0"	4' 7"	5' 0"	5' 4"	5' 8"	5' 11"
300 lbs.	3' 6"	4' 1"	4' 6"	4' 9"	5' 0"	5' 3"

TABLE II

For use where the slabs are by themselves, and not connected with reinforced concrete of adjoining spans.

Reinforcement, ⅜" round rods on 3" centers

Live load per sq. ft.	4"	4½"	5"	5½"	6"
70 lbs.	7' 10"	8' 8"	9' 7"	10' 4"	11' 4"
100 lbs.	7' 4"	8' 2"	9' 1"	9' 10"	10' 6"
120 lbs.	6' 10"	7' 7"	[illegible]	9' [illegible]	9' 10"
150 lbs.	6' 2"	6' 10"	7' 7"	8' 4"	9' 0"
200 lbs.	5' 3"	5' 10"	6' 6"	7' 1"	7' 8"
300 lbs.	4' 7"	5' 2"	5' 9"	6' 4"	6' 10"

TABLE III

For use where there are a number of slabs of reinforced concrete continuous over a number of beams, and all concreted and joined together.

[illegible]

Live load per sq. ft.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
70 lbs.	5' 9"	6' 8"	7' 9"	8' 4"	8' 9"	9' 1"	9' 5"
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
120 lbs.	4' 10"	5' 8"	6' 6"	7' 1"	7' 6"	7' 10"	8' [illegible]
150 lbs.	4' 5"	5' 3"	6' 1"	6' 7"	7' 0"	7' 3"	7' 7"
200 lbs.	4' 0"	4' 8"	5' 5"	5' 11"	6' 3"	6' 7"	6' 11"
300 lbs.	3' 4"	4' 0"	4' 7"	5' 0"	5' 4"	5' 8"	5' 11"
[illegible] lbs.	3' 0"	3' 6"	4' 1"	4' 6"	4' 9"	5' 0"	5' 3"

TABLE IV

For use where there are a number of slabs of reinforced concrete continuous over a number of beams, and all concreted and joined together.

[illegible]

Live load per sq. ft.	4"	4½"	[illegible]	[illegible]	[illegible]
30 lbs.	10' 6"	11' 5"	12' 6"	13' 5"	14' 3
70 lbs.	8' 9"	9' 7"	10' 7"	11' 5"	12' 3'
100 lbs.	7' 10"	8' 8"	9' 7"	10' 4"	11' 4"
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
200 lbs.	6' 2"	6' 10"	7' 7"	8' 4"	9' 0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The clear spans given in the tables refer to the clear distances between the steel beams supporting the slab, or the clear distance between the walls on which the slab rests. The rods should be longer than the clear span, and should go from beam to beam and extend across the beams or walls on which the slab rests, and should be bedded in concrete their full length. The concrete should be made of 2 parts by measure of Portland cement, 2 parts of clean sand, and 4 parts of clean hard stone to pass a 1-in. ring and graded down to smaller sizes. Run of crusher, with dust screened out, is about the best kind of stone. The concrete must be well mixed, and must be what is known as "wet" concrete—that is, mushy.

In all cases, in addition to the reinforcement that runs from beam to beam or between other supports on which the slab rests, there should be ¼ in. round rods about 2 ft. on centers at right angles with the main reinforcement, to prevent shrinkage cracks in the concrete.

All rods should be kept about 1 in. from the bottom of the slab, except at the supports, where they can be brought a little higher.

Example—In an ordinary dwelling, suppose we want to put a slab of concrete over a span, between walls, of seven feet.

A live load of 70 lbs. per sq. ft. is ample; and our table allows for the dead load of the concrete itself, besides 10 lbs. per sq. ft. for floor finish of wood or cement; so all we need is to look under live load of 70 lbs. in Table I, and we find that a slab 4 in. thick is required, with 3/8 in. rods on 6 in. centers.

If the span was 11 ft., we could span it for the same load from Table II, with a slab 6 in. thick, 3/8 in. rods on 3 in. centers. For many spans, we could choose between Tables I and II, depending on whether we preferred a thicker slab with less rods, or a slab not so thick and more rods.

These tables are based on the fibre stresses allowed by the Philadelphia Bureau of Building Inspection for first-class stone concrete.

The University of Pittsburg, Pittsburg, Pa., is entering upon a study of the smoke problem in the broadest possible manner. Those in charge of smoke investigations are taking as their chief line the effect of smoke on health, plant life and buildings, but they are also considering the increased cost of living due to damage and dirt caused by smoke and the legal as well as the engineering side of the question. Each of these investigations will be carried out by one or more men, each a specialist in his line. It is hoped that by co-ordinating these various researches it will be possible to obtain some valuable technical as well as scientific data: The investigators will at least be able to establish the status of the problem as a whole on a scientific basis.

Mr. J. E. Griffiths, Chief Engineer, Department of Public Works, Victoria, B.C., was recently at Nelson, B.C., making an examination of conditions affecting the proposed erection of a bridge over the narrows of Kootenay Lake near Nelson.

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* By Frank N. [illegible], C. E., in Building Age.

Competition Among Brick Manufacturers

Constructive and Destructive Practices and their Influence upon the Industry at Large Proper Attitude Toward Competitors

By R. E. Sunderland*

THERE is no conceivable forecast of the future of the brick business from which competition may be [illegible]. Competition has always given the brick man grave concern and competition stands out as the most important factor in any consideration of his future—at least up to the south edge of eternity. Beyond that, firebrick, perhaps!

We may well give this interesting phase of the brick business our most earnest and thoughtful attention.

There are two distinct and different kinds of competition; one is con-structive and the other is de-structive. One is consistent with all of those elements which tend to success, while the other savors of the characteristics which usually precede business disaster. One will build up the brick business until it is one of the greatest and most profitable pursuits upon the face of the earth, while the other will stunt its development and growth and cause it to yield but meagre earnings to those engaged in it.

In order to develop anything helpful or useful in this discussion we may first consider "competition" as a general subject and later divide it into the two particular kinds for further analysis.

Competition began when time first entered upon its flight. Human life—and all other life for that matter—is a record of the "survival of the fittest." Rivalry, contest, competition; these are parallel with progress and civilization.

Among men, among tribes, among nations, destructive competition with its annihilation, its desire to destroy, its greed for physical supremacy, such competition has written history in letters of blood uselessly, ruthlessly, lavishly shed.

Likewise among makers and sellers of brick there exists a destructive type of competition, with its annihilation, its desire to destroy, its insatiable greed for supremacy at any cost, and the history of it has been written and is still being written in the financial lifeblood of more than a few brick concerns desperately struggling for existence.

This sort of competition is not alone a relic of barbarism, but is characteristic of civilized nations, for civilization has inherited from savagery its brutal ideas of competition. But in no particular line of business in all branches of trade is there a competition more destructive than that which besets the face brick industry and it is the face brick business only to which this paper applies.

The present cut-throat, brainless competitive practices are the best evidence that many of us are just now where Darwin says we began. We are indeed making commercial monkeys of ourselves and of each other, and it is high time to take an inventory of the whole nation-wide business of making and marketing brick.

Every phase of the brick business involves the general subject of competition. Competition has for its foundation the law of supply and demand.

From earliest history man has desired a place in which he might live in safety and comfort; hence the demand for some sort of building material and (until modern times) he has always used the best available material, cost and efficiency considered. True, there have come changes in the kind and quality of construction, but such changes have been merely expressions of an inherent desire to use the best.

The wheels of time have slowly ground out our present conditions and, as before, men are still demanding the best construction materials of which they have knowledge, but they have not been told much about brick, and consequently have but little knowledge of brick.

To me the past brings but two considerations that are worth while, memories and lessons. Memories have no place in this discussion, but the lessons we have learned and those we have refused to learn make up the foundation upon which our success and failures are to be built.

The Primary Consideration

Where should a consideration of competition begin? With a wise brick man, it begins when his mind first turns seriously toward the brick business as a place to invest his money and his effort. He first considers the market, the trade conditions, the probability of realizing a satisfactory profit.

In taking these things into account his uppermost thought and his deepest concern is the question of competition. He says "Where am I going to land " which, being interpreted means, "What will my competitor do to me?" And he answers this question before he invests his money, if he has the build of a successful business man.

He knows, of course, that there will be competition. If he is wise (and wise men have been known to invest in brick factories and some of them have come out of it still wiser), he knows in advance the extent of that competition and it becomes a weighty factor in his consideration of the matter.

He must first determine upon a location. Does he conclude to locate at Hungrytown solely because, judging outward appearances, one factory seems to have prospered there —and without knowing there is business enough for an additional factory? Yes, too often—and with the usual disastrous effect upon one or both institutions and a reflex damage to the whole industry.

He must, of course, consider quality and availability of raw materials, cost of fuel, convenient and economical accessibility to the market, the demand for the particular kind of product—these and other essential questions are too seldom fully digested and too seldom decided upon the basis of the probable competitive advantages or disadvantages involved.

These are all competitive considerations and must of necessity have a bearing upon the outcome of the venture, but having established his plant, the real test of actual ability, breadth of vision, fitness or unfitness for ultimate success is that man's attitude toward his competitor. Does he become a con-structive or de-structive force in the brick business?

Attitude Towards Competitors

Read the record and see. Read your own record, Mr. Brickman, and point out to yourself wherein you have succeeded and wherein you have failed and you can trace your success or your failure in a large measure to your attitude toward your competitors and their attitude toward you. I wish to emphasize that statement and broaden it out so as to include the dealer as well as the manufacturer.

There has been a fatal absence of non-structive competition, which is another way of saying that, as a class, we brick men (manufacturers and dealers alike) have been active forces in an era of demoralizing, devastating, dangerous competition; we have been shortsighted, narrow, bigoted, stubborn, and jealous; we have sold our business birthright for a mess of lost opportunities and have robbed ourselves of both money and respect of the building public.

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* Before the National Brick Manufacturers' Convention at Chicago.

Take the new-born brick plant, conceived and delivered without thought of its own chance of a normal existence and with no regard to its effect upon brick society. What happens? Does the smart novice go to his established competitor and talk matters over, with a view to their mutual advantage. Does he try to develop a different product and attempt to establish a profitable business for it? Hardly! The usual attitude of the new recruit is that he will "show" his apparently successful rival what a precocious child can do, and he proceeds to do so, duplicating his product, cutting under his prices, knifing him in every possible way.

What does the aforesaid established manufacturer do? Does he suggest a conference, overlooking the fact that the young upstart should have first come to him on a similar errand? Does he use every possible means to save the situation for both concerns? You know the answer. He resents the intrusion and determines to show his inexperienced competitor that there is no room for both; he allots a short period, perhaps months, perhaps years, for his complete annihilation, meanwhile wasting his own substance, which might better have been spent for advertising or otherwise building up his own business.

And thus, with daggars pointed toward each other and with two-thirds of their energy, and thought directed toward a mutual desire to celebrate the other's commercial funeral, they proceed with the balance of their discouraged faculties to market their own brick. Gentlemen, this is a disgraceful picture, but no one can deny that it has many a counterpart in real life.

And what of the dealer? Is he a little angel of perfection whose whole soul is filled with a righteous desire to build up fortunes of his competitor? What of the dealer, that is, the face brick dealer?

The dealer is the man who comes into contact with the prospective or actual user of brick (and in so far as the manufacturer comes into this relation, he is also a dealer in the meaning of this paper). The dealer is the potential force whose influence upon the building public counts for good or bad for the brick business. The dealer is the salesman by whom the commodity and all of those interested in it are judged. First of all the dealer must sell his own line of brick. That is admittedly his first duty. What he may claim for his own brick, is not at present under consideration. That is a matter quite between himself and his customer. The wise dealer will tell the truth or his failure to do so—as in all lines of salesmanship—will be an asset to his competitor.

We may accept as legitimate any honest statement as to the quality and desirability of a competitor's product and any honest statement as to his ability to give satisfactory service in furnishing brick for a given project. As to the wisdom of such a practice, salesmen may differ, for some regard as dangerous any degree of "knocking;" that is, however, a matter of judgment and the legitimacy of the practice may be admitted

Destructive Practice in Competition

But we may well consider as wholly illegitimate, unworthy, distinctly discreditable and destructive—as well as finally unprofitable—certain vicious practices which are all too common.

The temptation to pursue contemptible methods is increased by the fact that most buyers of face brick buy but once and the effect upon future business is often thought to be unworthy of consideration. "Anything to secure this particular order" is too frequently the governing motive. But this can not satisfy any brick man who is a credit to the business or who has any desire to be a factor in upbuilding the industry.

What about dishonest statements as to a competitor or his brick? This covers a multitude of evil minded concoctions which could not emanate from any selfrespecting salesman, and which would not knowingly be tolerated by any concern of integrity and decency. And I desire to point out some of these vicious practices which constitute glaring examples of destructive competition and which must be abandoned if profitable business is to be developed to the utmost. Covering a brick with an invisible film of paraffine in order to beat the other fellow in an absorption test. Any comment necessary on such a practice? Selecting and showing a cull or an inferior sample of a competitor's product representing that it is a fair average sample—especially in the absence of that competitor—is hardly worthy of any man. A photograph of a brick job showing, as efflorescence a smear of lime or plaster dust under a window where debris had been thrown out of a building, is not conducive to good feeling between competitors. After losing an order in fair and square competition, it is hardly ethical to loiter around a building site for the purpose of making the buyer dissatisfied with the brick delivered by the other fellow. It is a distinctly unclean trick to allege that buying brick from a competitor is likely to delay a building, hanging such a suggestion upon the fact that on a former occasion the said competitor had the misfortune to have a car of brick lost in transit, an experience common to all shippers.

It is not at all constructive nor does it build up a profitable competitive situation for a brick salesman to prejudice a buyer by telling him that the brick offered by a competitor was formerly sold at a less price. How absolutely inconsistent with ordinary horse sense this seems and yet it is a common practice in some places.

Even if destructive methods could increase the demand for brick they would not be justified, but we all know that only by constructive policies can the use of brick be enlarged, and it is high time for us as brick men to get in line with real progress. If the misdirected energy that is being wasted upon destructive competitive practices, should be used to increase the public interest in brick, a marvelous change would take place.

So much for de-structive methods of competition. I have not pretended to include in this paper all of the practices which have been tearing out the very vitals of the brick business, but I have selected a few from the many that have come from my acquaintances among the brick men of the country and the instances may be considered typical rather than specific.

Constructive Phases

Taking up the constructive phase of competition let us begin with maintaining profitable prices.

Of all commodities face brick should bring a reasonable profit. First because the seller needs the money, and second, because there is seldom any fundamental necessity for cutting.

The best evidence of good judgment on the part of a concern or its salesmen is a decent consideration of competitors. Salesmen who are really salesmen, will talk color, quality, texture, the beauty of the finished wall, service, and every other profit protecting argument.

Genuine, brainy, constructive salesmanship will preserve margins so that he who finally lands the order may do so profitably.

Who thanks you, Mr. Brickman, for a [illegible] from which the profit has been squeezed? Surely not your competitor. Nor does the building committee, the owner, the architect nor the contractor. "The memory of quality lingers long after price is forgotten."

Practical Notes on Reinforced Concrete

Insufficient Attention to Details a Serious Shortcoming—Working Drawings Should Always be Furnished—Cleveland Code Commended

By S. W. Emerson

ONE of Cleveland's leading engineers, a man who during his thirty or forty years of active practice has designed many million dollars worth of structures in timber, structural steel and reinforced concrete, recently made this statement: "A reinforced concrete building properly designed and constructed, is the best building which can be built, but improperly designed or constructed it is the poorest."

Some of the advantages of reinforced concrete over other forms of construction are as follows: permanence, strength, freedom from vibration, fireproofness, economy, ease and rapidity of erection and sound-proofness.

Under the head of permanence little need be said as the fact is generally recognized that concrete instead of deteriorating with age continues to grow stronger with years.

As regards strength, a reinforced concrete building is much stronger than one of timber or structural steel designed to carry the same load. This may sound a good bit like the Irishman's remark "Tim was a big boy for his size," but let me explain.

If a steel or timber beam is put into a testing machine and the load applied, the beam will fail under a load, which can be quite closely calculated beforehand. The same thing is true of a reinforced concrete beam if subjected to the same treatment. If similar steel or timber beams are erected in a building and the floor is loaded to the point of failure, the steel and timber beams will fail under a load practically the same as that which caused failure in the testing machine. The concrete beam, however, when built into a floor becomes part of a large monolithic structure, and will carry a much greater load than that which caused failure in the testing machine. This is due to the continuous nature of the construction and the support given to each member by the adjoining portions of the floor. That this exceptional strength is found in actual construction, has been proven by the many tests made on completed buildings. Of course, in our design, we take advantage to a slight degree of these facts, but only to a very slight degree. Most building codes and authorities on design permit a reduction of twenty per cent. in the bending moment of continuous beams and girders.

In perhaps a hundred tests of floors in actual buildings at which the writer has assigned, or been present, in not a single instance did a floor fail to carry a load of two and one-half to three and in some cases as much as four times the figured live load, and in many cases where the design and workmanship was good, there was little or no permanent deflection after the load was removed. In cases where the design and workmanship were not what they should have been, more or less permanent deflection was caused by these loads, which, of course, meant that the floor would ultimately have failed if the load had been left on long enough.

Right here I wish to say something about the erroneous impression that frequently exists to the effect that if a concrete building should be over-loaded in any way, the failure would be in the nature of a sudden collapse without any warning to those occupying the building. This is a great mistake, arising, no doubt, from the reports of such failures as those of the hotel at Long Branch, California. The Eastman Kodak Building at Rochester, N.Y., the Garford Automobile building at Elyria, the Henke building in Cleveland and the more recent failure at Indianapolis. In all of these the failure was a sudden collapse, and in each case resulted in serious loss of life. All these, however, occurred during the construction of the building and were due to faulty design or workmanship, or in most cases to removing the forms before the concrete has properly hardened. In all cases the failure came immediately or shortly after the forms were removed. There have been very few failures of a concrete building after it had been completed and ready for occupancy, and none of these, to my knowledge have been serious or resulted in loss of life or serious injury to the contents of the building.

The writer has run across in his own experience only four cases where trouble has been experienced with the concrete in a building after it was completed and ready for occupancy. Two of these cases were in concrete slabs carried by steel beams and girders. Both of these were buildings which had been constructed some years ago when our knowledge of concrete was in its infancy, and in more of the cases were the slabs designed to carry even a small part of the loads to which they were afterwards subjected. In neither case did the slabs actually fail but sagged and cracked, until after several years of this abuse, a part of the heavy load which they were carrying had to be removed. Both floors are in use to-day, and carrying heavier loads than conservative practice would sanction. In the other two buildings, in one of which some large concrete girders had to be strengthened, and the other in which part of the columns started to fail, warning was given for months beforehand by cracking and spalling of the concrete. The same results are observed where concrete structures are over-loaded for testing purposes. Failure in every case is preceded by large deflections and cracking of the concrete.

The owner of a concrete building can, therefore, feel sure that if his building has withstood the heavy stresses to which it was subjected during construction and when it had attained only one-fourth to one-half its ultimate strength, he has a building that will carry any reasonable load to which it may be subjected.

In speaking of good design it is not sufficient to have enough steel and concrete to resist the bending moment at the centre of the beams or slabs, but it is of equal importance to provide properly for the reverse moment stresses over the supports, diagonal tension or sheer stresses, and other similar detail which very often receive but scant consideration.

Insufficient Attention to Details

One serious mistake which is being made at the present time is the erection of important structures with no other plans than general drawings furnished by the engineer, which give only the main sections and show in a general way the position of the rods, leaving all the important details such as the length of the splices, the position of the bends, length and spacing of the sheer rods, etc., to be decided by some estimator in the contractor's office, or foreman in the field, who has no knowledge of either the nature or amount of stress to be resisted. I can see no good reason why the contractor for reinforced concrete work should not be required to furnish complete shop or working drawings showing all the details of his work, in the same way that the structural steel contractor is required to do. When such drawings are prepared and checked by the engineer in charge of the work, it results in better construction and the saving to the contractor in the ordering of the material and erection of the work in most cases more than pays for the cost of preparing the plans.

Good Material a Necessity

It is needless to say that good material should be used from which to make the concrete. Our greatest trouble in this vicinity is with the sand, because of the temptation to use inferior bank sand, produced from the many excavations which are going on here all the time. Of course, there is nothing better than a good coarse, comparatively clean bank sand, but good concrete cannot be made with some of the fine, dirty stuff which is sometimes used.

About two years ago Clarence Regan and Hugh Emerson, students at Case School of Applied Science made, for their thesis work, a very complete study of the various materials entering into concrete work in this vicinity. One of the most interesting features of this investigation was the test made to show the effect of varying the proportion of cement. The usual specification for reinforced concrete work is, one part cement, two parts sand and four parts stone. Taking this as a unit, these tests showed that concrete mixed in the proportion of one part cement, one part sand and two parts stone was practically twice as strong as the unit, or to be exact, 1-90/100 times as strong, while concrete mixed in the proportion of one, three and five showed only 71/100 as much strength and in a one, four seven mixture only 6/10 as much as the unit.

Fire and Sound Resistance

For apartment buildings, hospitals, hotels, etc., the high resistance which concrete offers to the transmission of sound is a great advantage as well as its fireproof qualities. As a fire-resisting material, concrete has no equal. Additional proof of this is furnished every time a fireproof building burns up. For example, the Equitable Building, which was not fireproofed with concrete. But I imagine I hear some one say, "If concrete is so superior as a fireproofing material, why is it not used for all important buildings?" Probably the principal reason is to be found in the youth of reinforced concrete. It takes time to get architects and builders to change from materials and methods to which they have long been accustomed, and when one stops to realize the short length of time reinforced concrete has been used, the progress made is really remarkable.

The first reinforced concrete building erected in Cleveland is less than nine years old. I refer to the Salvation Army building on East Ninth street. The concrete work in this was executed by the Henebeque Construction Company of New York under the supervision of Architect Frederick Baird, and the building was completed in 1903. It was practically two years before any further concrete work of importance was attempted. The Ulmer building on Euclid avenue, and a small warehouse for the Sterling & Welch Company were built by local contractors in 1905. However, it may be said that reinforced concrete got its real start in Cleveland in 1906 or practically only five years ago. During that year a number of important buildings were constructed, including a large storage warehouse, a six-storey factory, and a large office building.

Naturally a new business growing so rapidly and attracting so much public attention has proved a very tempting but not always profitable field for contractors.

About a year ago, I made up a list, as completely as I could from memory, of the local companies or individuals who had gone into this work. On checking this over, I was somewhat surprised to find that more than two-thirds of all those who had taken up this work had already retired from the field, and since then some of the thirty per cent who had stuck up to that time, had also retired. While this percentage of failures may seem almost incredible to outsiders, it is not surprising to the man who knows the heavy over-head expense and the great number of unexpected items which go to make up the cost of every job, to say nothing of risk involved in the work.

Commends Cleveland Code

This paper would hardly be complete without some reference to the Cleveland Building Code. The Building Code is often looked upon as a necessary evil to the requirements of which we must submit (if we cannot find a way to avoid them) simply because it is the law.

The concrete section of the Code has been revised three times since its adoption. The last revision was made necessary by the introduction of several new ideas in construction, notably the so-called flat slab type of floors and hooped columns.

Cleveland, I believe, is the first city in this country to make any attempt to form regulations for this class of construction. Since the passage of this revision a number of cities have adopted the concrete section of our Code in its entirety, and I am only repeating the sentiment eypressed by the engineering press from all over the country, when I say that I think Cleveland has to-day a better set of concrete building regulations than any other city in the country.

Great Industry for North Vancouver

Preparations are being made for entering upon the construction of the floating dry dock which the Port of Vancouver Dry Dock Company will erect on a 10-acre site at Roche Point, North Vancouver. The authority for this statement is given as Mr. Charles S. Douglas, vice-president and managing director of the Imperial Car, Shipbuilding & Drydock Corporation, which sold to the Port of Vancouver Drydock Company its holdings and which is working on the whole scheme in connection with that company. The William Hamilton Shipbuilding Company, of Port Glasgow, Scotland, has been awarded the contract for the drydock and machinery to be used in its operation.

Commencement of construction of drydock will furnish work for between eight hundred and one thousand men and it is considered not unreasonable that ultimately the Port of Vancouver Drydock Company will spend $25,000,000 on Roche Point where, in addition to the property it has already acquired, it has taken an option on ground for a shipbuilding yard and on additional thousand feet of deep water frontage which will give it a total of two thousand feet.

The intention stated is to build merchant ships at Roche Point. The shipyards would employ probably three thousand men. The Dominion Government subsidized the building of the drydock and a subsidy for the shipyards is now being sought as it will be managed in connection with the drydock.

The drydock is to be so constructed that it can be enlarged from the present plans which give it a length of 659 feet and width of 35 feet. The plans will give a lifting capacity of 15,000 tons. This will be sufficient for the repairing of any ships now in use on the Pacific ocean.

Roche Point promises to soon be the most active place in Vancouver for, according to Mr. Douglas, the Imperial Car Shipbuilding & Drydock Company also expects to commence work on its big plant for the manufacture of the Imperial sleeping car.

Within a comparatively short space of time Roche Point will see a force of almost five thousand men at work at the car works, shipyards and drydock, according to Mr. Douglas. About five hundred acres in the vicinity have been acquired for these [illegible] and the holdings [illegible] a mile and a half of deep water frontage

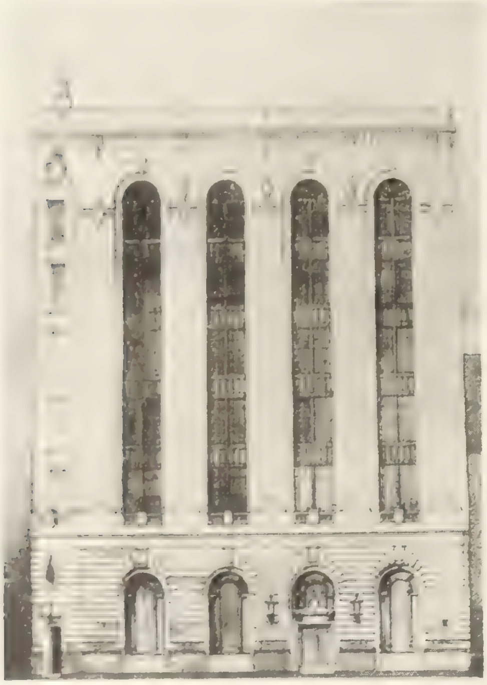
Calgary a Live Centre for Contractors

Continuous and Increasing Activity in all Departments of Business New Records in the Making—Labor Conditions Satisfactory

Special to the Contract Record and Engineering Review

Calgary, Alta, April 11, 1912

OF all the West, Alberta has been the most advertised, and in Alberta, Calgary seems to be reaping the best results. As the volume of business everywhere indicates, people are simply pouring into this district. Bank clearings for the first quarter of the year were 36 per cent. in advance of the three months in 1911. Building permits for the same period were one-quarter of a million dollars per month greater. The customs entries show an increase of $644,000 for the fiscal year ending March 30th. Bank clearings last week were 71 per cent. above the same week in 1911 and the street railway revenue almost doubled that of March a year ago. Certainly it looks like expansion.



Canada Life Assurance Company's Building at Calgary
Architects: Messrs Brown & Vallance

Among the larger undertakings is an irrigation ditch more than two miles across a depression in the prairie. It is probably the greatest engineering feat of its kind yet attempted on this continent. Of a thousand or more irrigation projects in the Dominion, the C.P.R. excels in the immensity of its works. Millions of dollars have been spent and more are to follow. The Irrigation Branch of the Department of Interior has many projects and many private schemes come under the supervision of its officers. Not long ago it was reported that the Dominion Government proposed adding the C.P.R. block to its list of public works but there are no surface indications just now of such a course being underneath. Two hundred men of the engineering staff of the C.P.R. Natural Resources department here are now in the field and when at its height the work will employ fifteen hundred men. Most of the actual earth, timber and concrete work is done by contractors, many of whom are already on the ground with their outfits. At one point in the work it becomes necessary to carry the irrigation canal more than two miles across a depression in the prairie. This it is proposed to do by a half round, open top, concrete flume, sixteen feet across, supported on the outer edges by concrete posts ten feet in height. Under the railway track the water will be syphoned.

Paving Awards

Opposition to the awarding of contracts for 300,000 square yards of paving has been much in evidence since the nature of the tenders became known. It has not only been a lively contest between representatives of the paving concerns, but it has developed into something of a family feud among the aldermen. The Commissioners first considered the tenders, making recommendations upon which the council had to act. Some of the aldermen talked of "raw deals," while the paving men mentioned law and patent right infringement. Certainly it will not be surprising if the outcome is not a step nearer the time when the municipality will own and operate a plant sufficiently large to do all its own work. When the smoke of the controversy cleared away it appeared that the resolutions, amendments and amendments thereto had resulted in 70,000 yards of asphaltic concrete going to the Crown Paving Co. at $2.12; 100,000 yards of sheet asphalt to the Calgary Paving Co. at $2.05; 100,000 yards to the Canadian Mineral Rubber Company at $2.50; 50,000 yards to the Bithulithic Contracting Company at $2.85 and 25,000 yards to the Alberta Granitoid Company at $2.65, per square yard in each case. The city will put down 75,000 yards with its own outfit. Until the next meeting of council the Bithulithic contract is held up and there may be a further protest against the award.

Trouble in the City Building Inspector's Department came to a head in the resignation of the present official. Applicants for the position are many. The emolument is $2,500 a year.

The City Planning Commission has its hands full in the program it has undertaken. It is hoped to have the city council go to the Provincial Legislature next session, for power to compel owners of vacant lots to clean these up failing which the city may proceed and charge the cost against the property as is done with other municipal rates. While hastening to grow Calgary has omitted much in the way of beautification, preference having been given to the more practical utilities of rapid transit, street lighting, water, sewerage, sidewalks and paving.

Labor Conditions

Labor conditions are in a fair way of settling down to a reasonable demand and supply for the construction season. Skilled workmen may not be as plentiful as the rush market would absorb. Ordinary handy men graduate very fast in this climate. Contractors have expressed a fear of carpenters being short, but the incoming rush, together with the fact that the woodworkers' plants are turning out more material every year with less fitting to be done, will provide for much of this particular demand.

A new map of Calgary shows fourteen lines of railway in operation, under construction or whose bonds have been guaranteed by the Province.

The street railway extension to the locomotive shops at Ceep-ar is to run under the railway tracks in East Calgary through a subway now being excavated at Ninth avenue.

City contractors are out after the railway companies alleging they do not get a fair share of work.

Dominion Day is scheduled for the entrance of the G. T.P. Only ninety miles of steel remain to be laid and six weeks of good weather will see the finishing of the grade on that distance.

Weather conditions continue ideal for all kinds of work.

Great Possibilities for St. John, N.B.

Mr. J. Norton Griffiths was recently the guest of honor at a banquet tendered by the Board of Trade at St. John, N.B.

In the course of an interesting address Mr. Griffiths paid a warm tribute to the enterprise of the citizens in commencing three years ago the harbor developments which had started the movement which had led to the Government's making the grant for the present development. Mr. Griffiths spoke optimistically of the future prospects of St. John. He continued in part:

"During the last twenty years of my life it has been part of my work to be constantly travelling and competing for the world's contracting work. Having visited almost all the leading ports of the industrial world, I may state without fear of offending your susceptibilities, that it astonished me when I first visited Canada some years ago to see how far behind you were in dock and harbor accommodation in comparison with other countries.

"Gentlemen, I really think that you as a nation have only just commenced to scrape what one may call the fringe of your possibilities in the development of the country as a whole.

"I repeat what I have said in connection with other undertakings, whether at St. John or elsewhere, that whatever development work you do in any direction you should be looking well forward to the time when these works are completed and even then you will be just as far from being able to cope with the demands as you are to-day.

The New York of Canada

"The position to my mind is this. You have only one or two important centres on the east coast of your great continent which are linked with your transcontinental railway systems. In taking time by the forelock you will have every chance in becoming the New York of Canada. None of us here, even the most optimistic, has any conception of the extent and wealth the principal eastern cities of Canada will assume. I have said over and over again that Vancouver must be the 'Frisco of Western Canada, and from what I can gather you have every possibility of making the running hot in becoming the New York or Liverpool of eastern Canada.

"Why is Liverpool an enormous shipping centre today? It is because it has given facilities for quickly and cheaply loading and discharging ships. Just imagine for one moment what the result would have been if Liverpool had been behindhand in her policy of development. She would never have had twelve miles of docks and quays which she has to-day, and these are now inadequate for the volume of trade handled there.

Tides No Barrier

It has been said that here at St. John there is a rise and fall in the tide which will always be a handicap to the economic development of the port. Let me tell you that such a statement is entirely erroneous and can only have emanated from those who have been misinformed or who are jealous of the great possibilities of St. John. At Liverpool there is a rise and fall of 30 feet, and in the Bristol Channel of about 40 feet. The success of these shipping centres and the economic manner in which they handle enormous volumes of traffic serve to dispel any doubts which may exist in your minds, for at St. John you have a maximum rise and fall of 28 feet, and there is nothing whatever in this direction likely to handicap the development of your port, provided you see to it that the dock and harbor works are laid out and constructed with a view to their being extended, which you will find necessary, I venture to think, before the present work is completed."

Mr. Griffiths cited the Argentine as a country which had made rapid strides following the completion of an aggressive policy of dock-building. The speaker concluded:

"Personally I should like to be allowed to make a record in time on this contract and to do what we did in London, Africa, Russia, and Chili, that is, to work the 24 hours of the day in 8-hour shifts.

"As to the Canadian company bearing my name, I wish to emphasize the fact that we are a Canadian company with large Canadian interests, and if this work proves a remunerative investment for us (though contractors very seldom, if ever, experience this, for as you know contractors never make money) whatever profits may accrue, it is unnecessary for me to say that while we have such an excellent Chancellor of the Exchequer on the other side of the water there is not the slightest chance of our trying to find a better field for reinvestment of those profits than Canada in general and New Brunswick in particular."

Mr. Burton Stewart, managing director for Messrs. Norton Griffiths & Company, spoke of the possibility of developing a large iron and steel industry in St. John and the erection of a shipbuilding plant at Courtenay Bay.

Others who spoke were Mr. Geo. W. Fowler, M.P., Col. McLean, M.P., His Worship the Mayor of St. John (Mr. Frink), Mr. F. G. Palmer (who will have charge of the Courtenay Bay work), and Mr. Warren, chief engineer for the Norton Griffiths Company. Mr. H. C. Schofield presided and there were about ninety members of the Board of Trade present. The dining room was elaborately decorated, a prominent feature being a model dry dock and steamship "constructed" of carnations, daffodils and ferns. The wall was decorated with groups of pictures representing the various undertakings with which the Norton-Griffiths firm has been identified.

Moose Jaw Builders' Exchange Organized

At an enthusiastic meeting of builders and contractors at Moose Jaw, last week, a local builders' exchange was organized. It was decided to adopt the constitution and by-laws of the Regina Builders' Exchange. A permanent secretary will be secured and suitable offices will be obtained. The first president is Mr. H. Navin, and the treasurer elected is Mr. J. Fidler. The directorate also includes Messrs. T. Potts, C. Forbes, A. Frost, T. Grayson and G. Marlatt. The following names were added to the list as members of the Exchange: Charles Forbes, contractor and builder; J. A. Blix, plasterer; T. H. Potts and J. Gowans, of Gowans & Potts, building contractors; John G. Morgan, of Messrs. P. Lyall & Sons Construction Company; R. G. Saunders, of Messrs. Wilson, Townsend & Saunders, contractors; G. Marlatt, of Whitlock & Marlatt; W. C. McManus and C. V. McManus, of the McManus Construction Company; H. Navin, of Navin Bros., builders; F. Barton and J. Donnellan, of Barton & Donnellan, plasterers; W. H. Ellis, Jr., general contractor; T. Whitehead, electrician; John Richardson, contractor, and John Fidler

Constructional Topics from the Coast

Building Conditions—The Supply and Labor Markets—Time Record for Reinforced Concrete Work—Engineering Projects

Office of the Contract Record,
Vancouver, April 10, 1912

WHAT has proven to be the record for the erection of a reinforced concrete building in this province has just been made on Richards street, east of Pender street, where the Northwest Canada Trust Company, Ltd., is erecting an eight-storey office building, a portion of which will be used by that company. The actual work of construction was begun on January 19th of this year, and the pent-house was completed on April 3rd, making a total of 65 days for the erection of the building. This time includes days when it was impossible to work on account of rain, so that the actual working time on the building was 55 days. It is expected that the building will be ready for occupancy by July 1, a record of five and one-third months for the entire building. The contract for this structure is being carried out by the Dominion Construction Supply Co., Ltd. The dimensions of the building are 50 x 78 feet. The structure is faced with buff brick, terra cotta and stone, with granite base, and concrete coping finished with terra cotta. The building will be heated by a low pressure oil and steam system, and the usual plumbing methods will be employed. Crane plumbing fixtures are to be used. The basement will be fitted up for a cafe, the ground floor for the offices of the Trust Company, and the upper seven floors will be divided into large offices. Quarter sawed oak trimmings will be used on the ground floor and birch on the upper floors. Two combination elevators will be used. These will be constructed so that at night, by the simple expedient of throwing a switch, they will run automatically on the "push button" plan. Messrs. J. P. Matheson & Sons were the architects of the building.

Building Conditions at the Coast

The leading building supply firms at the Coast are handling an immense volume of business these days. Orders have poured in freely since the fine weather arrived, and so far all previous business records have been easily outdistanced. It is estimated by the building inspector's staff that there are at present nearly one thousand dwelling houses in Vancouver in course of construction. Adding to these the list of big contracts being handled in the business sections, and the extensive building operations which are taking place throughout the outlying districts, the indications are clear that most firms which handle building materials are experiencing an unprecedented run of prosperity.

The building permits issued in Vancouver during the month of March came close to the $1,500,000 mark, totalling $1,434,290. While those were not so great in the aggregate amount of money involved as the corresponding month of the previous year, the permits issued this year really reflect a much better condition than last year. At that time the regulations limiting the height of buildings to ten storeys were about to come into force, and this led to the taking out of permits during February and March of 1911 on a number of large structures which were rushed to evade the new regulations. The number of residential permits taken out in March 1912 created a record for Vancouver, totalling 235, while the total number of permits for all classes of buildings, including dwelling houses, was 342, as compared with 269 in March 1911. Reports from South Vancouver, North Vancouver, Point Grey and other districts indicate that all sections are sharing in the marked increase in building operations.

March has proved a splendid month for building activity in Victoria. Permits for structures of an aggregate value of $861,770 were issued in March, compared with totals of $271,945 for the same month a year ago. The aggregate value of structures erected last year in Victoria was $4,026,315. To date this year the figures show buildings of a value of $2,852,725, or more than half the amount for the entire twelve months of last year.

The city of New Westminster is also experiencing an unprecedented building season, the permits taken out in that city during the month of March being valued at a total of $134,800, which amounts to $22,070 more than the corresponding month in 1911.

Prices of Building Materials at Vancouver

(Delivered on Job)

Building paper No. 1, tarred, per roll	62½c. to 75c.
Building paper, plain, per roll	.70
Bricks, common, per thousand	13.00
Bricks, pressed, per thousand	45.00
Cement, Portland, 4 sacks	2.80
Roofing, felt, per 100 lbs.	2.35
Fire brick, per thousand	45.00
Lime per bbl.	1.00 to 1.35
Sewer pipe, per foot, 4-inch	.13
Sewer pipe, per foot, 6-inch	.19
Plaster of Paris, per bbl.	4.25
Putty per pound, bladders in 100 lb. cases	3.40
Hard wall plaster, per ton	15.00
Nails, wire, per keg	3.25
Nails, cut, per keg	4.25
Mixed paint, per gallon	2.50
Boiled linseed oil, gallon in barrels	1.25
Boiled linseed oil, per gallon	1.35
Hair fibre, per ton	15.00
Fire clay, per ton	15.00
Lath, No. 1, pine	2.75
B. C. Cedar shingles, No. 1	2.10
B. C. Cedar shingles, No. 2	2.00
Lead pipe, per lb.	.06½
Dry Colors:—	
White lead, per lb.	.07
Red lead, per lb., kegs	6.50
White lead, per 100 lbs. in oil	8.50
Gasoline, in barrels, per gallon	.30

Local Labor Conditions

The labor market in Vancouver is apparently well supplied at present. Contractors and builders engaged on extensive works throughout the city and its environs are experiencing little difficulty in obtaining a sufficient supply of skilled workers, while the B. C. Electric and the city authorities are in a like position, both with regard to skilled and unskilled labor. There is, of course, what might be termed a permanent demand for railroad construction labor throughout the province, the supply in this respect being generally a little short of the demand. The determination of the I. W. W. organization to tie up all railway work in British Columbia presents a serious difficulty to contractors in the matter of obtaining a sufficient supply of men to finish the work within the specified time limit. It is generally conceded, however, that with the advantage of adequate police protection, the contractors should be able to proceed with a part of the construction, though some time must necessarily elapse before a sufficient amount of labor can be obtained to enable the work to be resumed as before.

The report that the labor troubles on railway construction work in this province is leading the government to relax the restriction in Oriental emigration laws, has no foundation. The Canadian Northern Railway cannot employ Asiatics in railway building. Their contract with British Columbia prevents it. Neither the federal nor the provincial government will intervene to supply labor. This is a problem for the contractors, who have all the European population to draw from. That the contractors have a perfect right to demand protection for men who desire to work was recently endorsed by Premier McBride, who assured the contractors that no violence would be tolerated, and ample police protection would be given.

Several hundred strikers, mostly foreigners, are now in Vancouver, and numbers are constantly arriving. The majority of these men are adherents of the I. W. W. organization, who are coming here with an idea of getting out on other work than the C.N.R.

The Dominion government order, that aliens could come into Canada to engage in railroad construction during the summer months without having to comply with the usual restriction as to possession of a certain amount of money, has borne fruit quickly. Numbers of men have already come from points in the United States, and Vancouver employment agencies dealing with this class of men are handling numbers daily.

In connection with contracts under the Vancouver Board of Works department it was recently decided at a meeting of the city council that in future a clause should be placed in all contracts calling on contractors to adhere to the recent alterations of the civic minimum rate of wages to $3.00 per day of eight hours.

Contract for Reclamation Scheme

The contract for an extensive reclamation scheme, embracing an area of 14,000 acres of fertile dairy and garden land in the Serpentine and Nicomekl Valleys, B. C., has been awarded to Mr. M. P. Cotton, of Vancouver, and a start on the work has already been made. The productiveness of this large area, varying in width from one to three and a half miles, has heretofore been limited by the action of the tide waters of Boundary Bay, backing up the Serpentine and Nicomekl rivers and preventing drainage. A dam will be built at the mouth of the Serpentine River, while steel flood gates will be erected at points on the stream to overcome the effects of the tides and provide for drainage. The engineer in charge of the work is Mr. H. C. Brice, of New Westminster, B.C.

The Victoria Breakwater

The preliminary work in connection with the Ogden Point breakwater, the first work of the outer harbor improvements at Victoria, was begun at the latter end of March. Mr. D. R. Harris, C.E., has been appointed by the public works department to make the soundings in preparation for the plans and specifications to be drawn for submission to contractors, and he is now engaged on the task. It is more than likely that some of the leading engineering firms of Great Britain, which have had considerable experience in harbor construction, will submit bids for this work, including that of Sir John Jackson (the engineer whose firm built the breakwater and harbor at Dover, England) the Norton-Griffiths Steel Construction Co., and the firm of S. Pearson & Son.

Important Commission for Mr. Mawson

Mr. Thomas Mawson, an honorary Associate of the Royal Institute of British Architects, and a noted landscape gardener, has been engaged by the Vancouver Park Commissioners to carry out extensive improvements in Stanley Park, which has an area of about 1,000 acres ,and is undoubtedly one of the finest national parks in the world. No better authority could have been secured by the city as an adviser in the work which the present administration has in mind than Mr. Mawson, as the briefest reference to what he has done will prove. In England he occupies a foremost position among landscape architects, and he has added to his professional duties the activities of a university lecturer and an author on the subjects with which he is so familiar.

Amongst the work Mr. Mawson has on hand at present is the designing of the extensions to the Haviadore at Copenhagen for the Dowager Queen Alexandra. He is also engaged in laying out the grounds and gardens of the Palace of Peace, at the Hague, a commission he secured in competition with leading European architects. During the past few weeks Mr. Mawson has been engaged in drawing up a preliminary report on a Parks system for Vancouver, and has also been consulted by the Victoria Parks Committee to advise that body as to the laying out of the civic park at Mount Douglas, and as to plans for general civic improvement. Mr. Mawson is also at work on the preparation of a report on several properties for the British Columbia Electric Railway Co., including their new park at Cadboro Bay, near Victoria.

Architects' Activity

These are very busy days in architectural circles. The new body, the British Columbia Society of Architects, is hard at work organizing branch chapters all over the province, and hardly a day passes but brings in fresh and encouraging news from the various points. The Vancouver chapter has a membership of about 100 out of possibly 300 in practice, and in Victoria the register is daily growing,—in fact all the leading architects of that city are now members. The British Columbia Society of Architects is the outcome of the amalgamation of the older societies, such as the Victoria Association of Architects, etc. This latter association held an extraordinary general meeting recently in the Arion Club hall, Victoria, to alter their title to the British Columbia Society of Architects, Victoria Chapter.

As soon as this business was disposed of, the new Chapter entertained all its members at a smoking concert. Architects are beginning to realize that it is to their advantage to help one another and work together in the interests of the profession. The new Chapter intends to open club rooms shortly. A series of lectures and social evenings is also in course of preparation.

C. P. R. Work at Coquitlam

The recent action of the C.P.R. in [illegible] large body of men to Coquitlam, 17 miles east of Vancouver, is an indication that the preparatory work, such as clearing up the land for the future terminals, has been completed. The work of filling in the site chosen for the yards and laying of tracks is to be carried out as promptly as conditions will allow. This force of men will be kept at Coquitlam, and added to until the completion of the work. The big task of filling in the site for the yards on the north side of the main line is contingent upon the completion of the double track from the Nicomen pit at Hammond, where all the dirt for the work will be secured. The grading between the two places has been practically finished, new tiles being already laid. Tenders for the first unit of the roundhouse were opened recently. The [illegible] roundhouse will be about 200 feet in diameter and will be fitted with a boiler room and machine repair shops. The building is to be of brick and concrete, with steel supports for the heating system. The first unit of the roundhouse is estimated to cost [illegible] representing one third of the whole structure. The steel for the above will be furnished by the C.P.R., while the contractors are expected to bring in all of the other materials.

Vancouver Labor Temple

The Labor Temple situated on the corner of Dunsmuir and Homer streets, which cost approximately $137,000, was built for the Vancouver Labor Temple Co., Ltd., by the Norton Griffiths Steel Construction Co., Ltd., contractors, and Mr. Thos. Hooper, architect. The Kahn system of reinforced concrete has been used in the construction of this building, the outer walls being faced with Clayburn buff pressed brick, with sandstone trimmings, and on the ground floor, tool granite. The entrance is faced in marble, and the floors of all the corridors are ceramic tile. The corridor walls are lined to a height of 4 feet with glazed tile, while the outside finish throughout is fir. Light standards to the number of 16 are placed along the roof of the building.

Eleven stores are contained in the ground floor, and there are 22 offices altogether, most of which will be used by the local labor delegates. The second floor contains a large union meeting room, and on the top floor there are two large assembly halls, which will probably be utilized for dancing purposes, meetings, etc. This structure presents a very substantial appearance, and has been built strong enough to carry another couple of storeys.

New Labor Temple at Vancouver, B.C.

Engineers Entertained

A very successful gathering was held at the University Club, Vancouver, recently on the occasion of the first annual dinner of the engineering alumni of the University of Toronto, Pacific Coast branch. There were speeches from a number of prominent engineers, among whom were Mr. James H. Kennedy, chief engineer of the Great Northern Railway, who replied to the toast of the old school, of which he was one of the first graduates. Mr. E. B. Hermon, the president, replied to the toast to the engineering profession; Mr. W. A. Clement, to the Canadian Society of Civil Engineers; Mr. R. Thompson, to the Canadian Mining Institute; Mr. George Haynes, city engineer of North Vancouver, to "Municipal Engineering;" Mr. A. P. Augustine, to the British Columbia Land Surveyors; Mr. James Hartney, to the Electrical Engineers; Mr. L. E. Jones and Mr. F. T. Smith, to the University of Toronto; Mr. K. E. MacKenzie, to the general engineering alumni of the University of Toronto; Mr. F. Broadfoot, to the American Society of Civil Engineers; Mr. F. MacKenzie to the American Society of Mining Engineers; Mr. Fyle and Mr. Broadfoot to "Athletics." The alumni memorialized the occasion by presenting to the club a handsome picture of the main building of the University of Toronto. Dr. Wilson, the president of the club, replied in a very appropriate manner.

New Provincial Bridges

The Provincial department of Public Works for B.C. has a large amount of bridge construction under way in various parts of the province. The new North Francois bridge, near Burns Lake, has been completed, and the bridge over the Nadina River at the west end of Francois Lake was to have been completed by the end of March. The new bridge over the Illecillewaet is well under way—in fact almost completed—and the main braces of the Coquahalla bridge are in place, and work on this structure is progressing rapidly. Arrangements are being made for bridges over the Columbia River at, or near Gateway and at Athalmer, while the Kicking Horse is to be bridged at Golden, and ferries are to be established at Brisco and Carbondale. Work on the new bridge at Trail is advancing very satisfactorily. The new Pitt River bridge near New Westminster, it is expected, will be undertaken next year.

Messrs. Palmer Brothers & Henning were recently awarded the contract for the construction of the big concrete Balaclava street sewer main in the Kitsilano district, Vancouver, this firm's tender amounting to $89,071. The sewer will form a trunk in the Greater Vancouver sewerage scheme.

The work of clearing the land for the right-of-way for the Port Moody-Coquitlam Dam railway, near New Westminster, has begun. The line will be rushed through as speedily as possible, and will probably be completed by the end of next December. The work is being carried out by the Vancouver Power Co.

The Hon. F. W. Aylmer, Dominion Government Engineer, spent a few days in Revelstoke, B.C., recently, chiefly in connection with the erection of the government wharf there. Plans for this wharf are said to be completed, and it is expected that the construction work will be undertaken during the spring and summer.

The United States Mine Workers of Vancouver Island, to the number of about 3,000 intend holding a grand reunion in Nanaimo in May 1st. The day is to be declared a civic holiday, Mayor Shaw and the council being on the committee to officially welcome the visitors to the city.

Mr. S. B. Birds, the well-known Vancouver architect who designed the hospital at Merritt, B.C., is to receive the appointment as architect in charge of the Municipal Hall to be erected shortly in Merritt.

Mr. C. S. Douglas, managing director of the Imperial Car, Shipbuilding & Drydock Corporation, announces that a contract has been let to the William Hamilton Shipbuilding Co., of Glasgow for the construction of a floating drydock for the Port of Vancouver Drydock Company. The site of the drydock is at Roche Point, on the north arm of Burrard Inlet.

The contract for concrete work in connection with the proposed new piers for the Great Northern Railway on Burrard Inlet has been awarded to Messrs. Cummings & Kiehel, of Seattle. It will involve the expenditure of $125,000. Work will be started within a short time. Messrs. H. Chase & Co., Seattle, have the contract for pile driving. The dredging contract has not yet been let. The entire improvement will cost over $400,000.

Personal Mention

Mr. T. H. Bryson, of Pembroke, Ont., has been appointed Town Engineer of Brockville.

At Montreal, Mr. C. H. Godfrey has been elected Controller in succession to Mr. Wanklyn, resigned.

Mr. F. L. Riggs, manager of the Imperial Construction Company, is the new Secretary of the Civic Guild of Toronto.

Mr. B. G. Michel, town engineer of Pembroke, Ont., has resigned to accept a similar appointment at Carleton Place.

Mr. Lea, Waterworks Engineer for the city of Vancouver, is coming east on leave of absence granted owing to ill health.

At Regina, the name of City Engineer Thornton is mentioned in connection with the vacancy caused by the resignation of City Commissioner McPherson.

Messrs. A. W. McConnell and S. Makepiece are the members of a new architectural firm which has opened offices in the Kent Building, Toronto.

According to an announcement from Vancouver, Mr. John Callaghan, of Winnipeg, has been appointed chief engineer of the Pacific Great Eastern Railway.

Mr. F. L. Somerville has been engaged to assist City Engineer Macallum of Hamilton in the preparation of a report on the C. N. R. situation in that city.

Mr. J. Montague Maver has been appointed contracting agent for the Northern Pacific Railway, with headquarters in the Imperial Bank Building, Victoria Square, Montreal.

President Falconer, of the University of Toronto, and Mr. Willis Chipman, President of the Engineers' Club of Toronto, were among the speakers at the annual dinner of the Central Railway Club held last week in Toronto.

Mr. Percy Thompson has been appointed Immigration Commissioner to Messrs. Norton Griffiths, Limited. The special duties of Mr. Thompson will be to assist in working out immigration schemes to attract British settlers to New Brunswick.

On March 25th, Mr. John A. Bensel, M. Am. Soc. C. E., State Engineer of New York, delivered an illustrated lecture, "The Construction and Maintenance of the State Roads of New York," before the Graduate Students in Highway Engineering at Columbia University.

Mr. Mason H. Baker, City Engineer of St. Thomas, has received many congratulations during the last week. He was married recently at St. Thomas to Miss Pearl Grant of that city. After the ceremony Mr. and Mrs. Baker left for New York and other eastern points.

Mr. Ben Michaud, secretary of the Quebec Provincial Department of Agriculture, has been appointed Deputy Minister of Roads, a branch created during the past session. The position has been made necessary by the big programme of road construction decided upon by the Government.

Mr. L. R. Greene, until quite recently manager of the advertising department of the Sherwin-Williams Company of America, with headquarters at Cleveland, has been appointed to a similar position in the offices of the Sherwin-Williams Company of Canada, and the Canada Paint Company, at Montreal.

Among those recently elected to membership in the American Society of Civil Engineers were Mr. Alexander S. Dawson, Chief Engineer, Department of Natural Resources of the Canadian Pacific Railway Company, Calgary; and Mr. Claude C. Hockley. Supt. Laurentide Company, Limited, Grand Mere, Que.

Mr. R. W. Evered, of Messrs. Evered & Company, brass founders, Birmingham, arrived recently at St. John by the Empress of Britain. Mr. Evered will spend three or four months in Canada visiting the principal cities between Halifax and Vancouver. His idea is to estimate the the business possibilities in the Canadian territory. Mr. Evered has travelled extensively in India and South Africa. He returned from China quite recently.

Mr. W. Burton Stewart, vice-president and general manager of Messrs. Norton Griffiths, Limited, was in Fredericton last week in company with Mr. P. R. Warren, chief engineer of the firm, and Mr. G. F. Palmer, who is to be the company's chief agent on the Courtenay Bay works. On April 10 Mr. Stewart appeared before the Provincial Government and pointed out that some years ago a subsidy amounting to $8,400 annually was promised to the Imperial Dry Dock Company if they proceeded with the proposed work at St. John. Mr. Stewart asked similar concessions. Mr. Stewart left on the evening of April 10 en route to Vancouver, where his firm is carrying on an extensive business.

Construction News and Notes

Edmonton, Alta., issued permits last month to the value of $778,000, and is looking forward to a record building season.

The City Council of Hamilton, Ont., proposes to put a tax on building by having a graded scale of charges for the issue of building permits.

Applications are being taken for the post of City Engineer of London, Ont., to fill the vacancy created by the resignation of Mr. I. F. Wilsie.

The Saskatchewan Sewer Pipe & Brick Company, Limited, has been in corporated with a capital of $225,000. The head office of the concern will be at Estevan, Sask.

The Canadian Pacific Railway is stated to be planning extensive improvements at Smith's Falls, Ont. An appropriation of $250,000 was made recently for this work.

At a meeting of the United Brotherhood of Carpenters held recently in Hamilton, a provincial organization was formed with Wm. Farough, president, and James Carty, secretary.

It is stated that work will be commenced immediately upon the new Canadian Pacific Railway elevators at Fort William. The capacity of the elevators will be 1,000,000 bushels.

The Canadian Northern Railway Company has let the contract for the construction of the first 50 miles of railway from Prince Albert toward Hudson Bay to William Osemun, Kinistino, Sask.

The Municipal Committee of the Provincial Legislature proposes to vest in the Ontario Railway and Municipal Board the authority to arrange for surveys within five miles of the city limits of Toronto, Hamilton and Ottawa.

Montreal building permits for March, which amounted to only $691,440, show a decrease on the corresponding month of last year, when the figures were $1,101,887. The figures for the three months' period are respectively $1,431,159 and $2,110,165.

Operations are about to be commenced on the new Canadian Pacific Railway offices at Edmonton. Tenders have already been called for the demolition of the buildings occupying the site. The first two storeys of the new structure are to be faced with Bedford stone and granite imported from Indiana.

One hundred stone cutters employed by the Quinlan-Carter Company went on strike last week owing to the alleged employment of non-union men. It is stated that the [illegible] to the arbitration of their differences but that they are prepared to bring their case before the [illegible] if necessary.

A large office building is to be erected in Calgary by the Canadian Home Investment Company, Limited. The structure will be ten storeys high and the building will be of steel construction. The cost is placed at $1,000,000. The Secretary of the Canadian Home Investment Company is Mr A. MacKenzie, of Vancouver.

There is little danger of a carpenters' strike in Toronto this spring. At a joint conference last week the employers offered a minimum rate of 40 cents an hour, with 42 to 48 cents an hour for expert workmen. The men wanted a minimum rate of 45 cents but it is practically assured that the employers' terms will be accepted.

The steel department of Factory Products, Limited, have completed their stock list of rounds, flats, squares, angles, channels, tees, etc., and are equipped and prepared to handle at once all orders for materials enumerated therein. The company have excellent facilities and are enabled to give 24-hour shipments from stock covering a wide range of material.

The firm of Scott, Hammond & Pratt, Limited, has recently been organized at 65 Victoria street, Toronto, to deal in building and mechanical supplies. The officers of the company are Mr. S. L. Hammond, President; Mr. A. C. Pratt, Vice-President, and Mr. J. R. S. Scott, Secretary-Treasurer.

The British Columbia Society of Architects, of which Mr. N. A. Leech is president, is completing arrangements for the holding of Vancouver's first architectural exhibition. The display will be made up of line and wash drawings, photographs and models. The date of the exhibition has not yet been decided upon, but an announcement will be made in the near future.

The Niagara Falls, St. Catharines & Toronto Railway Company (E. F. Seixas, General Manager, St. Catharines, Ont.) has applied to the government for the right to build a bridge across the Welland canal at Killaly street, Humberstone. This is the dividing line between Port Colborne and Humberstone. The intention is to extend the line east to Fort Erie, building at least as far as Crystal Beach this year.

A new scale of wages for civic workmen is under consideration at Vancouver. The rates now obtaining include the following: construction foremen, $3.50 a day; ward foremen (maintenance), $110 a month; laborers, 35c. an hour for an eight-hour day; cart men, $2.80 for a nine-hour day; pipe foremen, $3.50 to $4.50 a day; bricklayers, 75c. an hour; sewer foremen (maintenance), $110 a month; teamsters, $2.80 for a nine-hour day.

It is stated that plans have been completed by French and Belgian capitalists for the erection of a large shipbuilding and repairing plant at Sault Ste. Marie, Ont. The cost of the undertaking is estimated at $2,000,000, and it is expected that work will be commenced this summer. Among those interested are Mr. F. H. Clergue, of Sault Ste. Marie; Mr. Alex. Simpson, of Ottawa; and Mr. D. B. Potter, of London, England.

The reorganization of the Allis-Chalmers Company of Milwaukee, Wis., which has just been accomplished by the addition of more than $5,000,000 of new capital, cannot fail to strengthen the Canadian company, Messrs. Allis-Chalmers-Bullock, Limited, of Montreal. The latter company is a Canadian concern and is operated as such, but its interests are identified with the Milwaukee concern in such a manner that it will derive considerable advantage from the magnificent shops at West Allis, which are considered among the finest of the kind in the world. The reorganization of the Milwaukee concern has been accomplished to the satisfaction of all concerned therewith.

At a well attended meeting held last week at Windsor, Ont., a Good Roads Association for Essex was organized. Encouragement of the movement was given by Mr. Oliver J. Wilcox, M.P., and Hon. Dr. Reaume, both of whom were present and delivered addresses. Mr. Charles Montreuil, warden of Essex County, was elected president, and Mr. C. L. Barker, secretary-treasurer. Other officers will be elected later.

Permits to the value of nearly $1,500,000 were issued last month in Vancouver. The figures for March, 1911, were over $2,000,000, but they are stated to have included permits for a number of large structures which were never started. According to the City Building Inspector, Mr. Jarrett, there is more real building activity in Vancouver now than at any previous time in the history of the city. The prospects for a record season in the building trades were never brighter.

The Northern Anthracite Syndicate. organized recently by Andrew Laidlaw of Spokane, Wash., and associates in Eastern Canada, will have surveys started this spring for a railroad to develop 12,800 acres of coal lands in the Groundhog Mountain district of British Columbia, 150 miles north of Hazleton. This railroad is planned to run from the forks of Skeena and Stikine Rivers to the mouth of Nass River and Nasgoa Gulf. The syndicate plans to expend about $12,000,000 in the development of the field and the construction of the railroad.

The gradual absorption of all the cement interests of Great Britain under one control is being continued. The British Portland Cement Manufacturing Company (which is affiliated with the great Associated Portland Cement combine) has now absorbed the following businesses: Cameron, Swan & Partners, of Jarrow; J. C. Johnson & Co., of Gateshead, and Addison, Potter & Son of Willington Quay. It is understood that the Associated Portland Cement Company has made agreements with Continental and other competitors to prevent price cutting.

The International Supply & Construction Co., Ltd., of Canada has been incorporated with a capital of $100,000. The company's head office will be at Hull, Que., and there will be a branch office in Ottawa. The company will tender on all work in the cities of Ottawa and Hull, and also for the supply of material required by any corporation. Mr. H. Dupius, Mayor of Hull, is president of the company, Mr. D. R. Chene, the former city engineer of Hull, is vice-president, and Mr. E. Couture is Secretary-Treasurer. Mr. W. J. Code, barrister, of Ottawa, and Mr. P. Wilson, contractor, are also directors of the company.

In some directions, building operations in Montreal have been interfered with by the small supply of lumber. This is due to the shortage in cars, which has disorganized the lumber business, by holding up the execution of orders at the mills. One wholesale lumber merchant has over 7,000,000 feet on order, and of this he has been able to obtain only a very small quantity. Cars and engines are not available for its transportation. Many large buildings are being planned, and architects throughout the city are very busy. There is a scarcity of skilled draftsmen, however, and this is handicapping some of the firms.

The Calgary correspondent of the Contract Record, whose letter will be found in another column, reports gratifying progress in the thriving western metropolis. Among the buildings under construction in that city may be mentioned the C.P.R. shops, for which $2,500,000 has been expropriated; the C.P.R. hotel, which will cost over a million dollars; the Hudson's Bay building, which involves an expenditure of a million dollars, and half a dozen or more large business blocks, also the G.T.P. and C.N.R. passenger stations. The list of important work indeed is a long one. Outside the building field there is the Bow Island to Calgary gas pipe line—a four million dollar project—the C.P.R. irrigation scheme and the Dominion and Provincial Government work, to say nothing of an important municipal programme. "Railway construction this summer," writes our correspondent, "includes an inter-urban scheme which may or may not be realized in 1912, but it seems to have many points in its favor and is stated to be appealing strongly to the farmers, whose needs it is designed especially to supply."

The Newfoundland Government has submitted to the Legislature of the colony a proposal to sanction the borrowing of two million dollars in the London market to carry out the Government's policy of branch lines, making with the four millions already borrowed the sum of six million dollars for this purpose. The Minister of Finance explained that the reason for this new loan was that the original estimate of 250 miles was exceeded because it was found necessary to touch at the different settlements. They now estimated the mileage at about 350 and the sum required would be sufficient to complete the lines.

A disgraceful phase of the Canadian Northern Railway strike in British Columbia is that a number of threatening letters have been received by several railway contractors. One of these was addressed to Mr. Martin Welch and threatened dynamiting unless the demands made by the "Industrial Workers of the World," were complied with. At the last hearing the strikers were maintaining a careful lookout at Ashcroft, B. C. Cooks have been persuaded to cease work and contractors' teams have been prevented from delivering supplies. It is estimated that only thirty per cent. of the laborers are working on the company's lines.

On the location line of the National Transcontinental Railway, half a mile east of the Lois river, in Quebec, and crossing the rock, is an altered diabase, which contains veins of quartz from half an inch to a foot wide. Some of these veins contain chalcopyrite, which has colored the rock green, but as far as can be seen on the surface the quantity of copper ore is small. Four miles east of the Natagagan river, on the railway line, where a hole was dug to get water, clay has been found that would be suitable for the manufacture of bricks, tiles, and coarse pottery. Seven miles east of the Harricanaw river, on a hill a short distance north of the line, there is also a serpentine rock containing small threads of asbestos, not exceeding a quarter of an inch in length.

The annual report of Mr. Archibald Currie, engineer for the city of Westmount, covering 1910-11 shows that 7.47 miles were graded and surfaced; 3.37 miles of sewers constructed; 4.01 miles of concrete sidewalks and 7.06 miles of concrete curb and gutters built. The total amount of roads constructed and completed, including that during last year, amounts to 22.62 miles, and of roads graded and surfaced 25.01 miles. The city now has 25.90 miles of sewers; 39.23 miles of concrete walks; 9.57 miles of concrete curbs and gutters, and 1.721 miles of block crossings. The total sum expended last year in the road department on capital account was $209,134, road maintenance costing an additional $43,634. According to the report of the building inspection department, there were 185 buildings erected of a value of $1,435,682, the average cost being $7,760.

At Victoria, B. C., last week, a deputation of the British Columbia Society of Architects waited upon the Provincial Government to enter a protest against the terms of competition for the University Buildings at Point Grey, B. C. As announced in our issue of April 3rd, the members of the architectural profession were requested by the R. A. I. C. not to compete for the reasons that no independent assessors had been named; that the first prize was merged in the commission; and that no time limit had been placed upon professional residence and practice. Before the British Columbia Society sent their deputation to the Provincial Premier, repeated applications had been made to the Minister of Education, but without avail. The lack of technical knowledge shown in the conditions relating to the architectural features of the competition made it plain that the person who drew up the conditions was grossly incompetent. In regard to the matter of assessors it was felt that if the judges were no more competent than those who drew up the conditions of contest it would be useless to spend time and money on the competition. The members of the deputation emphasized these points and asked that in consideration of the extensive nature of the work the prize money should be divided into five awards insted of three, as suggested.

Montreal Agency Firm Re-Organized

The agency business formerly operated under the name of Eadie-Douglas, Limited, with head office at 12 University street, Montreal, has been re-organized, and the name changed to Douglas-Milligan Limited. Mr. H. G. Eadie has withdrawn absolutely from the business, and the present organization consists of Mr. H. P. Douglas, President; Mr. G. M. Milligan, Vice-President, and Mr. E. M. Watson, Secretary-Treasurer.

The Toronto branch office is now under the management of Mr. W. F. Gouinlock, with offices in the Confederation Life Building, and the company is represented by agents in the leading cities throughout Canada.

Among the well-known concerns represented by Messrs. Douglas-Milligan, Limited, may be mentioned: B. F. Sturtevant Company, Boston, Mass.; Keystone Fireproofing Company, New York City; Leeds Fireclay Company, Leeds, Eng.; McFarlane-Douglas, Ottawa; Alphons Custodis Chimney Construction Company; Edward Darby & Sons Company, Inc., Philadelphia, Pa.; Avery Scale Company, North Milwaukee, Wis.; De La Vergne Machine Company; Jewett Refrigerator Company, Buffalo, N. Y.; Escher Wyss & Company, Zurich, Switzerland; Richardson-Phoenix Company, New York City; Roberts Filter Manufacturing Company, Philadelphia, Pa.

C. G. E. to Build at Montreal

The Canadian General Electric Company, who at present occupy the building at the corner of St. Sacrament and St. Peter streets, Montreal, have purchased an extensive property on the south side of St. Antoine street, opposite the new Canadian Pacific Windsor Street Station, upon which they will commence this spring the erection of a handsome office and warehouse building to be used exclusively by the Canadian General Electric Company and the Canada Foundry Company, Limited.

The building, which has been designed by Messrs. Ross & McFarlane, architects, will be a handsome structure of cut stone and brick, consisting of five storeys and basement. The offices, showrooms, and warehouse floors will be equipped with every modern device for facilitating dispatch of business, and will afford ample space for the company's rapidly increasing trade.

The Canadian General Electric Company have within the last two or three years either purchased or erected suitable buildings for their requirements in Halifax, Toronto, Winnipeg and Vancouver, and the erection of the Montreal building is in pursuance of their policy to provide every possible facility for taking care of the growth of business

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Chatham, Ont.

Sealed tenders will be received by clerk until April 22nd for the construction of cement walks to be laid during the year 1912. Specifications may be seen and form of tender obtained at the City Engineer's office, E. G. B. Adams. Chairman of Board of Works, C. E. Lister. Clerk, W. T. Merritt.

Dundas, Ont.

The council expect to spend $25,000 during the summer on the construction of walks, etc. Mayor, J. H. Woodhouse.

Hespeler, Ont.

Work will start as soon as possible on road improvement. For information write to Town Clerk. Estimated cost $[illegible].

High River, Alta.

Tenders will shortly be called for power house, machinery and sewage disposal works. Contract "a" labor laying water main and sewers. "b" furnishing materials for and erecting water tower; "d" furnishing cast iron water pipes and special castings; "e" furnishing fire hydrants, gate valves, etc.; "o" labor on main outfall sewer; "s" furnishing sewer pipes and junctions; "w" furnishing 4,500 ft. of 12-in. wooden pipe. Plans and specifications may be seen at the office of the engineers, Toronto and Winnipeg, and at the town hall, High River. For further information apply to R. A. Wallace, Mayor. The lowest or any tender not necessarily accepted. Mayor, R. A. Wallace; Secretary-Treasurer, G. E. Mack. Engineers, Chipman & Power.

Ingersoll, Ont.

The town council has decided to get a report from Engineer Chipman of Toronto on the matter of a sewer system immediately.

Lachine, Que.

The Town Council intend passing a by-law to authorize the borrowing of $5,000 for extensions to waterworks system. For particulars address the Chairman of the Lachine Waterworks Committee.

London, Ont.

Grand Trunk Railway company have petitioned for brick pavement on Shakespeare street from Downie to New Station and the Board of Works has the matter in hand and tenders will be called for shortly.

North Battleford, Sask.

Plans are prepared for construction of 25,000 square yds. concrete sidewalks. Cost about $45,000. Engineers, Chipman & Power, Mail Bldg., Toronto.

Plans are ready for construction of sewers, brick or concrete pipe 8-in. to 15-in., length 17,311 ft. Write Town Clerk, North Battleford. Engineers, Chipman & Power, Mail Bldg., Toronto.

Ottawa, Ont.

Plans and specifications may be seen at Engineer's office and tenders will be called shortly for paving of 4 streets with asphalt, 6-in. concrete foundation, ¾-in. binder, 2½-in. asphalt surface, yardage of about 20,000 sq. yds. Estimated cost $50,000. Engineer, N. J. Ker.

Regina, Sask.

Tenders are called until April 18th for 2722 lin. ft. 60-in. reinforced concrete sewer pipe; 1697 lin. ft. 54-in. reinforced concrete sewer pipe; 4419 lin. ft. 24-in. reinforced concrete sewer pipe; 7272 lin. ft. 45-in. reinforced concrete sewer pipe; 3155 lin. ft. 42-in. reinforced concrete sewer pipe; 2777 lin. ft. 40-in. reinforced concrete sewer pipe. Tenders for all or any part of above pipe will be considered. The city reserves the right to reject any or all bids and to waive any irregularities therein. Plans, specifications and forms of tenders may be obtained from the Chief Engineer. Chief Engineer, J. M. McKay, Trunk Sewer Works, Regina.

Saskatoon, Sask.

Tenders are called for concrete sewer pipe. Specifications may be seen at engineer's office for 41,000 ft. of concrete sewer pipe, pipe to vary in size from 5 in. to 24 in. Received by Engineer until April 19, 1912. Engineer, Geo. T. Clark.

Simcoe, Ont.

The matter of installing a new sewage system will be taken up at the next meeting of the township. Mayor, Gibson.

Stratford, Ont.

Tenders are called for pavements. City Engineer, M. Ferguson. Specifications and further particulars may be had on application to Engineer's office. Received by engineer until 5 p.m., April 22nd, 32,000 sq. yds. of pavements; lowest or any tender not necessarily accepted.

Toronto, Ont.

Tenders are called for 1 concrete batch mixer not less than 14 cu. ft. capacity loose material, to be mounted on street railway trucks of four ft. 10 in. and ⅞-in. gauge (4 ft. 10⅞). Specifications and form of tender may be obtained on application to the Department of Railways and Bridges. City Engineer's office, Toronto. Mayor, G. R. Geary, Chairman Board of Control.

Tenders are called until April 23rd for construction of sections No. 10 and 11 high level interceptor. The former comprises the construction of 3,890 lin. ft. and the latter 2,930 lin. feet of 4 ft. 6 in. diameter circular brick sewer. Plans, specifications and form of tenders may be obtained at the office of the City Engineer. Lowest or any tender not necessarily accepted. Tenders received by registered post only at the office of the Board of Control, addressed to Chairman. Engineer, C. H. Rust; Mayor, G. R. Geary.

Victoria Harbor, Ont.

Five miles of concrete sidewalk will be built in new subdivision, also 2½ miles of road grading is to be done. tenders for which are open. Address, The Realty Exchange Co., 84 Victoria street, Toronto. R. Paul Vance.

CONTRACTS AWARDED

North Battleford, Sask.

Waterworks extension. Engineers, Chipman & Power, Mail Bldg., Toronto. Contractors, Ker Engine Co. (Hydrants, valves, etc.). Pipes, 18,564 ft. of 8-inch cast iron pipe.

Vancouver, B.C.

General improvements, cost $300,000. Shaughnessy Heights, for C. P. Railway. General contractor, M. P. Cotton Co., Vancouver, received awards for paving Connaught Drive, 80 ft. wide, and for the construction of sewers, sidewalks and curbing, the supply of pipe and paving of macadam for all streets between King Edward Blvd. to Whitehead Road from Marguerite to Selkirk.

Windsor, Ont.

Geo. Caldwell & Co. have been awarded the contract for 20,000 yards of paving on May and Hall avenues, to cost $27,184.50.

Contract is awarded for waterworks. New 8,000,000 gal. pumping engine. Chairman, T. W. Brooke, Water Commissioner. Secretary, W. A. Hanrahan, Windsor.

Railroads, Bridges and Wharves

Kincardine, Ont.

Tenders to be called shortly for repairing Russell street iron bridge, which was partly washed away in recent flood. Address Town Clerk for information.

London, Ont.

C. P. R. will build a new addition to the roundhouse in the form of a quadrant and added to present round house, making it a ¾ circle. Building is to be partitioned for 10 engine stalls.

Extensive repairs will be made to the London breakwater which was badly damaged by floods. The council are considering the expenditure of $200,000 for this work. City Engineer, G. A. Wright.

Lucknow, Ont.

Carding Mill bridge was wrecked and dam torn away by recent flood. Plans are being prepared for new structures to cost $5,000.

Malton, Ont.

Tenders are called until April 23rd for bridge, (concrete abutments and floors). Malton Bridge over the Mimico Creek on the town line between counties of York and Peel near the village of Malton, for the counties of York and Peel. Plans and specifications may be obtained at the office of the County Engineer, Frank Barber, 57 Adelaide street, Toronto. Also for Cockburn bridge over the Humber on road between lots 15 and 16, con. 7, Vaughan township.

Niagara Falls, Ont.

The property owners have petitioned for a 30-ft. bridge over Muddy Creek and Council will deal with this matter shortly.

North Battleford, Sask.

Plans are in preparation for C.N.R. subway to cost $40,000 to be constructed of concrete and steel. The C.N.R. have been ordered by the railway commission to file their plans with the town of North Battleford the 20th of April, 1912.

Paisley, Ont.

Mill dams owned by Mr. James Stark at the towns of Lockerby and Pinkerton were badly damaged by floods and will have to be rebuilt. Estimated cost $10,000.

Quebec, Que.

Tenders are called until July 2nd for dry dock for the Dominion Government. Engineers in charge, Department Public Works. Dimensions of dock 1150 ft. x 110 ft. x 37 ft. Plans and specifications may be seen at the Public Works Department, Ottawa. All tenders must be accompanied by certified cheque for $30,000 payable to Minister of Public Works.

Walkerton, Ont.

The C.P.R. bridge at Walkerton was completely destroyed. Work will begin as soon as possible on a new steel structure. Engineer in charge, (Divisional Eng., London.

Wingham, Ont.

Bridges at Gorrie, Wroxeter, Teeswater and Wingham were badly damaged by recent floods and will be replaced shortly by new bridges of steel construction, plans for which are now being prepared. Estimated cost $20,000.

CONTRACTS AWARDED

Southampton, Ont.

Contract is awarded for bridge to cost $60,000, for County of Bruce. County Engineer, Mr. Talbot. 2 almost new steel bridges were completely destroyed by floods. Plans will be prepared for new bridges at once.

Public Buildings, Churches, Schools, etc.

Aylmer, Ont.

Plans are being prepared for public library to cost $12,000. Brick and stone construction, electric lighting, all interior equipment will be required. Write to Town Clerk for information.

Calgary, Alta.

Plans are ready for erection of a public abbatoir for Calgary Abbatoir Co. Architects, Craig & Major. Two-sty., 86 x 60.

Chatham, Ont.

Hospital Board are contemplating extensions to the hospital at a cost of $5,000. Brick construction, steam heating, electric light.

Guelph, Ont.

The Hospital Board propose to spend $25,000 in making interior improvements and installing the latest equipment.

Plans are ready for club-house to cost $10,000 for Guelph County Club. Work will start as soon as the frost is out of the ground.

Tenders will be called for the erection of a Masonic Temple. Chairman Building Committee, J. A. Howitt; architect, Mahoney, Guelph.

Hamilton, Ont.

St. Luke's Church Board are planning to erect a new Sunday School at a cost of $5,000. Rector, E. N. R. Burns, 206 Macauley street E.

Wardens G. E. Waller, 45 Delaware avenue, & S. G. Richardson, 90 Sandford avenue, are at present looking for a new site for the erection of a new church for St. Peter's. Rector, J. W. R. Ten-Eyck, 57 Erie avenue.

Plans are being prepared for arena rink and grandstand to cost $118,000 for Dr. Leeming Carr, 415 King street E., and Alderman Walter Elliott, 208 Wentworth street N. Architect, Munro & Mead, Main and Hughson streets. Buildings will be concrete, structural steel and brick. $55,000 of the above amount was provided for an artificial ice plant.

Hanover, Ont.

Whole and separate tenders will be received for the building of a six-room school in the town of Hanover up till April 30, 1912. Plans may be seen at the home of Geo. Hollinger, and at Forster & Clark's, architects, Owen Sound. The lowest or any tender not necessarily accepted. Secretary, Dr. A. B. Taylor. Chairman of Board, Mr. Geo. Hollinger.

Hespeler, Ont.

Walter Hussen has leased premises and will at once fit up a theatre. All interior equipment, seating, electric ltg., etc., needed.

Plans are to be prepared at once for new brick post office building, complete interior fittings and interior equipment will be required. Cost $10,000.

Lansdowne, Ont.

Tenders are called for school to cost $6,000, for Lansdowne Public School Board. Architect, B. Dillion, Brockville. Two-storeys, stone and brick, stone foundation, hot air heating, metal shingle, pine flooring.

Lindsay, Ont.

Tenders are called for erection of a school for the township of Emily. One-storey with basement, stone foundation, brick, coal oil lamps, hardwood floors, brick and stone to be furnished by Bd. Ventilating system arrangement to be attached possibly to box stove. Specifications may be seen at secretary's office or Inspector Broderick's office. Sec., Clement Zealand.

London, Ont.

Travellers Club have had plans prepared by architect, H. C. McBride for erection of a club house to cost $15,000. 3-storey, 35 x 100, red pressed brick and sandstone, steam heating, electric lighting, gymnasium, and bowling alley.

The city is planning hospital extension to cost $20,000. Chairman, Col. Wm. Gartshore. City Architect. Mr. Nutter. 3-storey, 30 x 30, stone foundation, brick construction, steam heating, hardwood floors, complete new sanitary arrangements private for each ward, elevators, telephones, cots and general furnishing.

Montreal, Que.

Architects Saxe & Archibald, Beaver Hall Hill, have prepared plans for building a transept as an addition to St. James Apostle Church on St. Catherine street west to cost $35,000.

Plans are in preparation for club-room and offices on Mansfield street, for University Club, 401 Dorchester street west. Architect, Nobbs & Hyde, Beaver Hall Hill. 5-storey, modern in details.

The Amherst Park Congregational Church, c/o H. Moule, Congregational College, Montreal congregation are contemplating building a church on Huntley street. Plans not ready yet. Architect, J. Seath Smith, 207 St. James street.

The Congregation L'Englise du Redempteur has just bought corner of Sherbrooke and Cartier streets and named a building committee to proceed at once on the erection of a new church. Pastor, Rev. H. E. Bevoit, 1105 Sherbrooke street E.

Nelson, B.C.

Tenders are called for fire hall to cost $18,000. Engineer, G. C. MacKay. 2-storey and basement, 49 x 68, granite and concrete foundation, cement and brick construction, steam heating, electric lighting, telephones, troughs, automatic strikers, tower 70 ft. high, and 10 ft. square fitted with steam coils, 6 stalls, 10 beds in dormitory. Tenders received by Wm. Wasson at Nelson.

Ottawa, Ont.

The Directors of The St. George's Society propose to build a new club house on condition that their premises on Bank street are sold. Secretary, E. J. Law.

Port Arthur, Ont.

Competitive plans are asked for school to cost $60,000, Prospect avenue, for Port Arthur School Board. Chairman, Geo. H. Rapsey; Secretary, J. W. Morgan; Superintendent, Frank Rourke. 2-storey, concrete and stone foundation, brick, stone and steel beam construction, steam heating, electric lighting, gravel and tar roofing, hardwood flooring, fire-escapes, ventilating system, htg. boilers.

Port Colborne, Ont.

The present post office building will be remodelled and the latest interior equipment and appointments will be installed. Cost $6,000.

Preston, Ont.

It is proposed to build a new post office here at a cost of $10,000. Brick and stone, electric lighting, steam heating, complete interior equipment needed.

Princeton, B.C.

I.O.O.F. Society plan to erect a hall to cost $5,000. Architect, Mr. King.

[illegible] [illegible] 40 x 100, concrete foundation, frame construction, hot air heating, electric lighting.

St. John's, Que.

Plans are in preparation for erection of a college building for St. John's College Board. Architect, G. A. Monette, 97 St. James street, Montreal. Private tenders will be received by architect.

Saskatoon, Sask.

Plans are in preparation for exhibition grand stand, seating capacity will be 4,000. Successful architect, H. J. Payton.

Plans are in preparation for moving picture theatre to cost $9,000, on 20th street, for F. A. Blain. Architect, D. Webster. 1-storey, 30 x 120, brick construction, steam heating, electric lighting, pitch and gravel roofing. Opera seats required.

Tenders are called until April 25th for school to cost $130,000 for Saskatoon School Board. Architect, D. Webster, Saskatoon. Sec.-treas. of Board, Wm. P. Bate. 3-storey, 71 x 160, cut stone foundation, brick and stone construction, shingle roofing, steam heating, electric lighting, fir floors, ventilating system, sprinklers, telephones, dynamos, fire alarm system, master and secondary clock system, motors and vacuum cleaning system.

South Middleton, Ont.

Tenders will be received by W. N. Fisher until May 1st for alterations to public school building.

Strathroy, Ont.

Mayor Owens and Council are planning the erection of a new school on Withredge avenue to cost $45,000. Brick construction, seating, blackboards and general collegiate equipment needed. Tenders will be called shortly.

Walkerville, Ont.

Plans are in preparation for Roman Catholic Church. Priest, Father Robert. Architect, John Boyd, Windsor. Stone foundation, pressed brick construction, hot air heating, electric lighting. Equipment for seating 400 and organ and general appointments required.

Weyburn, Sask.

Weyburn Hospital Board are contemplating the erection of a new hospital. Architect, Thos. Halley, Winnipeg. Mayor, J. W. McTaggert. Town Clerk, Geo. Ross.

Tenders are called for collegiate institute to cost $175,000. Secretary, J. C. Jarrett, Weyburn. Architects, Ross & McFarlane, Winnipeg. 2-storey, 70 x 125, stone foundation, solid brick construction, tar and gravel roof, steam heating, electric light, fir trimming, maple flooring. Fan system to be installed. Received by Secretary until May 12th.

Windsor, Ont.

Architects, Crane & Pennington of Windsor will prepare plans for a handcome new theatre to be built shortly for J. M. Ward, c/o Avenue Theatre, Detroit, Mich. All seats, electric fixtures, heating equipment and general interior appointments will be needed. Cost $10,-000.

Plans are in preparation for theatre to cost $20,000 on Pitt street, for Jos. Appleby, Windsor. Architects, Crane & Pennington, Windsor. 2-sty., 65 x 60, brick foundation, brick construction, steam heating, electric lighting, composition roofing, pine floors, fire-escapes, large seating capacity, stage fittings, motion picture equipment required.

CONTRACTS AWARDED

Aylmer, Ont.

Work has started on picture theatre to cost $10,000 for Joseph Davis. Brick construction, electric lighting, steam heating, complete interior equipment, seats, electric fittings, and general appointments will be purchased.

Brantford, Ont.

Y. M. C. A. building to cost $100,000, Queen and Darling streets. Secretary, Geo. L. Goody (local). Architects, Burke, Horwood & White, 27 Toronto street. 4-storey, 132 x 160. General Contractor, Schultz Bros. Ltd., Brantford. Electric contractor, Lyons Electric Co., 61 Colborne street, Brantford.

Galt, Ont.

Y. M. C. A. Building. Local Secretary, W. R. Cook, Architects, Shattuck & Hussy, Chicago. 3-storey, 70 x 122, red brick, stone facings, stone foundation, steam heating, electric lighting slate roofing, hardwood and interior finish, vault and fire-escapes, gymnasium, bowling alley and billiard tables. General contractor, A. E. Faulkner. Separate trades will be sub-let.

Montreal, Que.

Institution for the blind to cost $40,-000 on Notre Dame de Grace Ward. President, P. E. Layton, St. Catherine street. Architects, Hutchison, Wood & Millar, 50 Royal Insurance Bldg., Montreal. General contractor, C. E. Deakin, 11 St. Sacrament street, Montreal. Steel work, Dominion Bridge Co., Ltd., Lachine. Electrical work, Canada Ford Co., St. James street. Ornamental iron work, Montreal Arch. Iron Works.

Motion picture theatre, cor. Notre Dame near Charlevoix street, for The Duchess Amusement Co. Architect, Dufort & Decary, LaPatrie Bldg., Montreal. Contractors: Glaze terra cotta work, Francis Hankin, 230 Coristine Bldg., Montreal. Brickwork, Gadoury & Gagnon, 349 Wolfe street. 3-storey, 66 x 100, brick, terra cotta trim, columns and arches, masonry foundation, gas and electric lighting, tar and gravel on plank roofing, marquise in architectural iron and glass, iron staircase, hardwood finish, concrete flooring with mushroom reinforcement resting on concrete piers, auditorium to seat 1400, galleries, boxes, railings.

North Battleford, Ont.

Collegiate Institute to cost $80,000. Sec.-treas., Hugh Moher, North Battleford. Architect, David Webster. Stone foundation, brick and stone construction, steam heating, electric light, electric fan ventilator, air washer, gymnasium in basement. Tenders will be called when architect's plans are finally approved.

Ottawa, Ont.

Additions to clubhouse for Rideau Canoe Club. President, W. E. Gowling, 174 Wellington street. General contractor, Richard & Bingham, 23 Baird street, Ottawa.

Preston, Ont.

Addition to public school to cost $15,-000. Mason Contractor, Edward Tach, Preston. Carpenter, James Eagle, Preston. Heating, Burnhart & Giles Co. Metal ceiling work, The Preston Metal, Shingle & Siding Co.

Toronto, Ont.

The contract for porous terra cotta and fireproofing of the new Duke of Connaught School on Morley avenue has been awarded by the Board of Education to Robert Bennett, contractor, Scarboro Junction, Ont.

School to cost $8,500, Leslie street, for Separate School Board. Masonry, Mr. John McGlue, $4,356. Carpentry, Thos. J. Sullivan, $2,900. Painting, J. O'-Hearn, $329. Plastering, Messrs. Beaver & Co., $334. Structural steel, Messrs. Douglas Bros., $200. Electrical wiring, W. B. Gibson.

Vancouver, B.C.

School to cost $63,000. Contractor, El Oso Paving Co., 344 Granville street. 8-room modern fireproof school building. Plumbing contract will be awarded aside from the general contract.

Walton, Ont.

Church to cost $11,000, for The Presbyterian Congregation. General Contractor, Jno. Hunter, Brussels, Ont. Stone foundation, brick and stone foundation, electric lighting, complete interior equipment, seats, organ, etc., will be needed.

Residences

Brockville, Ont.

Tenders are called for residence to cost $5,000, Ormond street, for John Ridgley. Architect, B. Dillon. Two-storey, 40 x 30, stone foundation, brick construction, hot air heating, electric light and gas, metal shingles, pine finish.

Calgary, Alta.

Plans are ready for residence to cost $4,000, Mt. Royal, for Ross & Thompson, 1513 5th street west. Architect is owner and builder. 2-storey, 28 ft. 10 in. x 28 ft. 10 in., concrete foundation, frame construction, hot water heating, electric light, shingle roofing, hardwood floors.

Jordan Station, Ont.

Plans are being prepared for residence to cost $3,000, for Mrs. Smith. Brick construction, electric lighting, complete interior furnishings will be required.

Lachine, Que.

Plans are ready for 4 tenements for G. W. Dalbac. Architect, T. Dalbe Viau, St. Gabriel street. 2-storey and basement, 52 x 60, brick encased.

London, Ont.

Plans are being prepared for residence to cost $5,000, for G. F. Brickenden, Queen's avenue. 2-storey, concrete foundation, brick, electric lighting. Work to start as soon as possible.

Montreal, Que.

Plans are in preparation for residence, Peter street, for A. N. Brodeur, 86 St. Peter street. Architect, Saxe & Archibald, 59 Beaver Hall Hill.

Geo. T. Hartt, 80 St. Luke street, is planning to erect a new residence on Pine avenue, at a cost of $18,000. Plastic brick construction.

Plans are ready for 2 residences, Notre Dame de Grace Ward, for Z. Limoges, 614 St. Paul street. Architect, G. A. Monette, 97 St. James street.

Plans are in preparation for residence

to cost $15,000, Pine avenue, for E. G. M. Cape, 275 Sherbrooke W. Architect, Saxe & Archibald, Beaver Hall Hill.

Plans are in preparation for erection of a rectory on St. Catherine street for St. James Apostle Church. Architect, Saxe & Archibald, 59 Beaver Hall Hill.

Plans are ready for residence, corner Nelson and Strathern, for Howard Murray. Architect, Peden & McLaren, 20 St. Alexis street. 2-storey, 15 x 15, brick.

Plans are in preparation for residence on Percival avenue, for W. Percival. Designer, E. W. Barnes. 2½-storey, 64 x 32, brick construction, asbestos shingle roofing, hot water heating.

Plans are ready for 5 flats to cost $3,500, Fullum street, for Ulric Gauvreau, 245 Iberville street. 3-storey, 26 x 40, stone foundation, brick construction, gas and electric light, gravel roofing.

Plans are in preparation for residence, Strathern avenue, for E. B. Johnston, Ryde street. Designer, E. W. Barnes, 2126 Mance street, Montreal. 2½-sty., 62 x 38, brick construction, asbestos and shingle roofing, hot water heating.

Plans are in preparation for residence, Fenwick avenue, for Hugh McPherson, 1974 Hutchison street. Designer, E. W. Barnes, 2126 Mance street. 4½-storey, and basement, 32 x 31, concrete foundation, brick encased, asbestos and shingle roofing, hot water heating, electric light, tiled bath room, hardwood floors.

Ottawa, Ont.

New tenders are called for residence for Thomas A. Beament, 281 Gilmour avenue. Architect, C. P. Meredith, 126 Sparks street. 3-storey, solid brick, electric lighting. Old tenders and specifications cancelled.

Peterborough, Ont.

Architect, Colwell, Tanner & Tanner, Guelph, are preparing plans for the new apartments to be erected at Peterborough. Complete information and details may be had on writing direct to architects. Cost $20,000.

Renfrew, Ont.

Plans are in preparation for residence to cost $5,000, on Raglan street, for John [illegible]

Saskatoon, Sask.

Plans are in progress for apartments to cost $40,000, for Anderson & Morten. Architect, G. H. Burgenhagen, Saskatoon. Brick, fireproof and reinforced construction, steam heating, electric ltg.

Tenders are called for residence to cost $6,000, Nutana, for J. J. Conn. Architect, Thompson, Daniels and Colthurst. 2-storey, concrete foundation, [illegible] heating, [illegible] lighting, frame construction, shingle roofing.

Tenders are called for residence and garage to cost $8,000, Spadina Crescent, for Chas. R. Hill. 2-storey, concrete foundation, brick and stone construction, vacuum steam heating, electric light, shingle roofing, oak flooring.

Tenders are called for terrace to cost $30,000, City Park, for Wm. Gougeon. Architect, W. W. LaChance, Saskatoon. 2-storey and basement, brick and stone trimmings, electric lighting, vacuum steam heating, pitch and gravel roof, fir floors.

Toronto, Ont.

Tenders are ready for residence for Dr. MacFayden, 98 Rusholme road. Architect, Mr. Stewart, Stair Bldg. Tenders will be received by owner.

Tenders are open for 2 apartment houses to cost $20,000, S.E. cor. Glen road and Binscarth road, for P. H. Finney, 43 Victoria street. 3½-sty., brick, stone foundation.

Tenders are open for residence to cost $9,000, St. Andrews Gardens. Architects, Bond & Smith, 19 Wellington west. 2-storey and attic, brick and stucco, slate roof, hot water heating, combination light, cut stone, mantles, plate glass.

Westmount, Que.

Plans are in preparation for residence to cost $5,000, on Clark avenue, for W. Borbridge, 4821 St. Catherine street. Architect, Peden & McLaren, 20 St. Alexis street. 2-storey, brick encased. Tenders will be received by architect.

Plans are in preparation for Manse to cost $11,000, Westmount Park, for Melville Presbyterian Church. Architect, Westmount, Saxe & Archibald, 59 Beaver Hall Hill.

Windsor, Ont.

Plans are being prepared for residence to cost $8,000, for Dr. W. A. MacDonald, Victoria avenue. Architect, Crane & Pennington. 3-storey, 27 x 40, offices and basement, brick foundation, brick construction, hot air heating, electric lighting, shingle roofing, oak floors. Tenders will be received by architects.

Winnipeg, Man.

Tenders are called for apartments, cor. Burrows and Salter streets, for H. Hirsh. Architects, Hooper & Hooper. 3-storey, 62 x 90, stone and brick construction, steam heating. electric lighting, galvanized iron on wood rolls, birch trimming.

Plans are ready for residence to cost $8,000 for D. Marrin. Architect, Ross & McFarlane, Union Bank, Winnipeg. 2-storey, 35 x 36, stone foundation, brick construction, steam heating, electric ltg., shingle roofing, hardwood flooring. Tenders received by architect, close April 30th.

CONTRACTS AWARDED

Brockville, Ont.

Contracts are awarded for alterations to residence to cost $4,000, for Mrs. Samuel Flint. Hot water heating, electric lighting, interior finish of walnut, rosewood and mahogany. Mason contractor, Pattison & Fox. Carpenter. Fred. Clow, Brockville. Painting and glazing, Jackson & Dowell, Brockville. Plumbing and heating, Brown and Semple, Brockville. Electric work, A. P. Louch & Co.

Calgary, Alta.

Residence to cost $4,000, Buckingham avenue, for W. M. Christie. 943 15th St. N.W. Contractor is owner. 2-storey, 31 x 31, concrete foundation, brick veneer, hot air heating, shingle roofing.

Plans are ready for residence to cost $3,500, Bankview, for J. E. Ralls. Contractor is owner. 2-storey, 21 x 40, concrete foundation, frame, shingle roofing, hot air heating, electric lighting.

Plans are ready for 2 residences to cost $6,000, Hillhurst Crescent, for A. McDougall, 924 14th avenue west. Contractor is owner. 2-storey, 19 x 34, concrete foundation, frame, hot air heating, electric lighting, shingle roofing.

Plans are ready for residence to cost $4,000, in Rosedale, for Lea & Goulding, 703 Sifton Blvd. Contractor is owner. 2-storey, 24 x 36, concrete foundation, frame, shingle roofing, hot air heating electric lighting, hardwood flooring.

Plans are ready for 2 residences to cost $6,000, Mount Royal, for Banks & Crocker, 1540 Buckingham avenue. General contractor is owner. 2-storey, 23 x 28, concrete foundation, frame, electric lighting, hot air heating, shingle roof.

2 residences to cost $5,000, for J. Ingham, 2715 17th street east. General contractor, F. Farndall, 8 Dutch Canadian Block. 2-storey, 18 x 36, concrete foundation, frame construction, electric lighting, hot air heating, shingle roofing.

Plans are ready for 2 residence to cost $6,000, New Edinburgh street, for R. J. Burns, Box 1103, Calgary. Owner is builder. 1-storey, 19 x 43, concrete foundation, frame construction, hot air heating, electric lighting, shingle roofing.

Plans are ready for 2 residences to cost $6,000, Mount Royal, for Lea & Goulding, 703 Sifton Blvd. Contractor is owner. 2-storey, 22 x 34, concrete foundation, frame, shingle roofing, hot air heating, electric lighting, hardwood floors.

Plans are ready for residence to cost $5,000, 15th avenue west, for Gordon Parsons, Board of Trade Building. Contractor, J. W. Henderson, Board of Trade Bldg. 2-storey, 18 x 34, concrete foundation, frame, shingle roofing, hot air heating, electric light.

Hamilton, Ont.

Residence to cost $3,300, Eastburn ave. for D. Henry, 193 West avenue N. Mason contractor, C. Kidd, 398 Barton st. E. Carpentry, 193 West avenue N. Plaster, J. Mowatt, 78 Cathcart street. Heating, Robert Dow, 15 Bay street N. Plumbing, J. Cummings, 310 King E. 2-storey, 31 ft. 6 in. x 31 ft. 6 in., brick and stone construction.

Kenora, Ont.

Residence to cost $16,000, for Wm. C. Camoin. Architects, Ross & MacFarlane, Winnipeg. 2-storey, 40 x 40, solid brick, stone foundation, vacuum, steam, electric lighting, shingle roofing, hardwood floors. General contractor, Staines & Ferguson, 447 Rosedale avenue, Winnipeg. Heating not let.

Montreal, Que.

Six flats to cost $6,000, Gardiner St., for A. Gregoire, 559 Rivard. General contractor is owner. 3-storey, 41 x 42, stone foundation, pressed brick construction, gas and electric lighting, gravel roofing.

Excavation has started on 3 flats to cost $7,000, St. Dennis street, for J. H. Bohemier, 736 Huntley street. General contractor, Desjardins & Gelinas, 677 Bourbonnier avenue. 3-storey, 32 x 75, stone foundation, brick and stone con[illegible] electric light.

Alterations to residence to cost $6,975, 368 Mountain street, for Dr. Fred Tooke, 368 Mountain street. Architect, [illegible] Montreal. General contractors, Byers & Anglin, 65 Victoria street. 1-storey [illegible] brick, gravel and slate roof.

Residence to cost $20,000 for J. N. Laing, 110 Marks street. Architect, K. [illegible]

General contractor, W. M. Irving, 6 Guy Block, St. Catherine street W., Mtl. Plumbing and heating, J. A. Gordon, [illegible] St. Antoine street. Painting and glazing, Ryan Bros., 162 Mansfield St.

Excavation has started on 6 flats to cost $11,000, on St. Hubert, for Emanuel Rochon, 977 St. Hubert street. Architect, L. R. Mont Briant, 230 St. Andre street. General contractor is proprietor. 3-storey, 25 x 40, masonry foundation, brick and stone construction, hot water heating, electric lighting, gravel roofing.

Foundation is completed for 6 flats to cost $10,600, Gauthier and Papineau ave., for Denis Demers, 1334 St. Catherine east. Architect, L. A. Contant, 11 Place d'Armes Hill. General contractor, A. Roberge, 786 Barnier street. 3-storey, 36 x 65, concrete foundation, brick encased construction, hot water heating, gas lighting, gravel roof.

Contract is awarded for 3 residences, Dorcester street, for Henry Upton, 227 Notre Dame street. Contractors—masonry and brick work, W. M. Irving, Guy Block, St. Catherine street W. Plastering, Mitchell & Wilson, 87 Notre Dame street west. Carpentry, T. H. Hudson & Co., Bd. of Trade Bldg. Electric wiring, H. E. P. Bulmer, 30 York ave., Westmount. Roofing, Campbell, Gilday & Co., Ltd., 663 St. Paul street. Contractor for steel work, Dominion Bridge Co., Ltd., Lachine, Que.

Ottawa, Ont.

Residence to cost $3,000, Bower Hill avenue, for L. Lacasse, 94 Spadine ave. Contractor is owner. 2-storey, 18 x 36, concrete foundation, brick veneer, electric lighting.

Residence to cost $3,000 for J. Polaven. Bell street. Builder is owner. 2-storey, 31 x 40, stone foundation, brick veneer, hot air heating, electric light, tar and gravel roofing.

E. A. Rivers has started work on the erection of a residence to cost $2,900 on Archibald avenue. 2½-storey, 36 x 30, stone foundation, brick veneer, hot air heating, electric light, pitch roof.

Residence to cost $5,000 for Wm. Spalham, Queen west. General contractor, H. H. Edge, 118 Arthur street, Ottawa. 2-storey, 33 x 44, stone foundation, brick veneer, electric light.

Contract is awarded for residence to cost $3,800, on Mutchmor street, for B. Palef, 8 Adelaide street, Ottawa. Masonry, J. Lester, 3rd avenue, Ottawa. Carpentry, F. Shroder, 45 Mutchmor street.

Residence to cost $4,000, Sunnyside avenue, for Charles Band. General contractor, Patrick Ellemert, 624 Cooper st., Ottawa. 2-storey, 29 x 38, concrete foundation, brick veneer, electric lighting.

Residence to cost $4,000, Mackay ave., for Geo. Roy, 881 Somerset street. Contractor is owner. 2-storey, 38 x 40, stone foundation, brick veneer, hot air heating, electric light, tar and gravel roofing.

Residence to cost $7,000, York street, for Jos. MacRoix. General contractor, Narcisse Giroux, 497 St. Patrick street, Ottawa. 2-storey, 28 x 60, concrete foundation, brick veneer and iron clad, electric lighting.

Residence to cost $4,200, Canal road, for C. Brooks, 232 Flora street, Ottawa. Masonry contractor, E. Spence, 12 Foster street, Ottawa. Stone foundation, brick veneer, electric lighting, hot air heating, tar and pitch roof.

Excavation has started on residence to cost $5,500, First avenue, for L. Johnston, 84 4th avenue. 2-storey, 36 x 26, stone foundation, brick veneer, hot air heating, electric light, tar and gravel roofing. Owner is builder.

Work has started on residence to cost $3,200 on Archibald avenue, for K. Cohen, 140 Nelson street, Ottawa. Owner is builder. 2-storey, 36 x 32, stone foundation, brick veneer, hot air heating, electric light, tar and gravel roofing.

Apartment house to cost $52,000, Gloucester street, for E. R. McNeil, 54 Cartier street. Architect, A. L. Weeks, 229 Sparks street. General contractor, William G. Adamson, 126 Sparks street, Ottawa. Building on present site has been demolished.

Contract is awarded for residence to cost $14,000 on Salisbury avenue, for Judge Anglin. Architect, W. E. Noffke, 26 Central Chambers. Mason contractor, A. Tubble, Ottawa. Electrical contractor, J. A. Ellacott, Ottawa. Stone foundation, solid brick construction, electric lighting, tar and gravel roofing.

Residence to cost $33,000, on Daly avenue, for F. F. Ahearn, Alkert street. Architect, W. E. Noffke, Central Chmrs. General contractor, Holbrook & Sutherland. Marble and tiling, Sanitary Tiling Co., Mtl. Carpentry, Smith Bros., Ottawa. Painting and glazing, Howe & Co., Ottawa. Plumbing and heating, J. R. McLennan, Bank street. 2½-storey, and basement, 81 x 49, stone foundation, brick, hot water heating, electric light, pitch roof, basement to contain coal room, billiard, store, boiler room and laundry. Plans and specifications at architect's office.

Sherbrooke, Que.

Work has started on residence to cost $3,500 on Kingsman avenue, for J. Wilkinson. Architect, H. James, Sherbrooke. 2-storey, 30 x 38, stone foundation, wood construction, hot air heating, electric light, wood roof.

Toronto, Ont.

Plans are ready for residence to cost $3,200, Clendennan avenue near Annette street, for A. A. Robinson, 454 Quebec avenue. Architect, W. Mellisip. 2-sty., brick. Contractor is owner.

Contract is awarded for residence to cost $3,000 on Ramsford road, for E. M. Biette, 850 Manning avenue. Architect, E. Churchill. Contractor is owner. 2-storey and basement, brick.

Contract is awarded for apartment house on St. Clair avenue, for Sheldrake and Matchett. Architect, Mr. Leonard Foulds, Leader Lane. Carpentry, J. H. Champion. Masonry, Mr. J. Pichard.

Plans are ready for pair residences to cost $6,000 on E.S. Oakwood street. Builder, A. Edmonds. Semi-detached, brick, concrete foundation, shingle rfg., hot water heating, electric lighting, cut stone, mantles.

Contract is let for residence to cost $20,000, in Rosedale, for A. J. Gough, 78 Roxborough avenue E., Toronto. Architect, H. Simpson, 82 King street E., Toronto. Masonry, Hollbv Bros. Carpentry, Alex. McLeod. Plumbing and heating, D. J. Glynn & Son. Sheet metal, C. P. Brecken. 2½-storeys, tapestry brick, stone foundation, spanish tile rfg., hot water heating, combination lighting, refrigerators, mantles, hardwood finish, dimensions 75 x 60.

Winnipeg, Man.

Apartments to cost $75,000 on Clark street, for S. D. Richardson. St. James street. General contractor, Alex. Jamieson, 450 Agnes street. 3-storey and basement, 70 x 110, stone foundation, red brick and stone, oak and maple floors, steam heating, electric lighting, fire escapes, boilers and steel balconies.

Plans are ready for apartments on Smith street, for J. T. Bergman, 640 Alverston avenue. Architect, V. W. Horwood, Provincial Architect's office. Contractor is owner. 3-storey, 60 x 44, stone foundation, brick and stone construction, steam heating, electric light, asbestos fireproof roofing, oak and maple floors.

Business Buildings and Industrial Plants

Blythe, Ont.

The Blythe Flax Mill Co. will build a mill with complete new machinery on receipt of loan from the council for $5,000. Plans are being prepared in anticipation of grant.

Calgary, Alta.

Plans are ready for office building to cost $50,000, for R. L. Burns, Center St. Architect, Leo. Dowler. 3-storey, 100 x 130, brick construction.

Plans are under way for an office building and theatre to cost $100,000, East Calgary, for Dr. Blow, 7th avenue W. Architect and engineers, Alta. Engr. Co., Elma Block. 75 x 103, fireproof throughout.

Plans are ready for remodelling of corner and theatre to cost $400,000, 21st street west and 8th avenue, for Hon. J. A. Lougheed, Clarence Block, Calg. The entrance to theatre will be on 1st street. Stage will be completely turned around and provision to be made for large cafe and grill in basement of office building. Office building proposed to be 10 storeys, 75 x 130.

Chatham, Ont.

The by-law carried to provide for a machine plant to cost $100,000 and St. Mary's Machine Co. of Ohio, Manager, D. Anderson, will install machinery at once in premises formerly occupied by the Swift Motor Car Co. A new equipment will be required.

Galt, Ont.

Wm. Preston will locate a new plant here for the manufacture of lathes and planers, also tools, complete new equipment and machinery will be required.

Guelph, Ont.

C. J. Furber Co. will equip a new factory for the manufacture of metal weather stripping screens and ventilating appliances. Necessary equipment will be required.

Hamilton, Ont.

The American Locomotive Co., 30 Church street, New York City, are contemplating building a construction plant to cost $200,000.

Kingsville, Ont.

Plans are in preparation for alteration to hotel for The Windsor, Essex & Lake Shore Ry. Architects, Crane

& Pennington, Windsor. Complete new plumbing in new annex, maple flooring, composition walls.

Lindsay, Ont.

Plans are ready for garage on Lindsay street for Melville Robinson and Thos. Arnold. 1-storey, 30 x 40, stone foundation, cement wall, front and rear, electric lighting, shingle roofing, hardwood flooring. The wall of present building on north side to be used, also wall of present building to south.

London, Ont.

T. Dexter & Son are considering buying property and enlarging present flour mill or else constructing an entire new mill at a cost of $40,000.

The London Street Railway Co., Manager C. B. King, will equip a car repairing plant and will purchase all necessary machinery. Cost $7,000.

The Battle Creek Breakfast Food Co., Dundas street, have had plans prepared by architects Moore & Munroe for erection of a factory; 4-storey and basement, 50 x 100, modern in every detail. Cost $25,000.

A company is being formed to equip a chain of ten cent stores all through the district and a charter will be applied for at once. Complete store fittings and equipment will be needed. Address F. H. Brewster, London.

Plans are being prepared for biscuit factory to cost $250,000, for D. S. Perrin & Co. Architects, Moore & Munroe, London. 6-storey, stone foundation, brick construction, steam heating, electric light, gravel roofing. Biscuit, box and candy making machinery required. Elevators and boilers required.

Ald. Hubert Ashplant has plans prepared by architects Moore & Munroe for erection of sample rooms on Carling st. 5-storey, 33½ x 75, stone foundation, steam heating, electric lighting, gravel roof, telephones, elevators and modern fittings for 30 sample rooms will be required. Tenders received by Moore & Munroe. Cost $25,000.

Montreal, Que.

Scroggies Ltd. will shortly make extensive additions and improvements to the front and interior of the store on St. Catherine and Peel streets.

Findlay & Howard, real estate brokers, are contemplating an office building 10 storeys, 93 x 65, to be erected corner Notre Dame and St. Peter streets. Plans will be prepared.

J. C. McGreevy Syndicate, 58 Commercial Union Bldg., Montreal, plan to erect an arcade for departmental stores to cost $3,000,000, Metcalfe and Peel streets. Building to be 9 or 10 storeys, modern in every detail.

Plans are ready for 1 store and 14 tenements, cor. Stadacona and St. Germain streets, for Denis Messier, 1 St. Germain street. Architect, J. D. Viau, St. Gabriel street. 3-storey, 75 x 75, brick and wood construction, private tenders received by architect.

Plans are ready for stores and residences to cost $12,000, cor. Atwater and Quesnel streets, for Jos. Picard, 555 St. Antoine street. Architect, McDuff & Lemieux, 48 University street. 3-sty., 27 x 76, concrete foundation, brick, gravel roofing. Tenders received by architect.

Nelson, B.C.

Plans are in preparation for brick block to cost $10,000, for E. K. Strachan. Two-storey and basement to be used for warehouse and offices.

Ottawa, Ont.

Foundation is completed for shop to cost $15,000, Wellington street, for F. Mohan, Wellington street. 3-storey, concrete foundation, concrete and solid brick, tar and gravel roofing, electric lighting.

Ottawa, Ont.

Plans are prepared for an office bldg. on Sparks street, for J. C. Booth. Architect, J. A. Ewart, Sparks street, Ottawa. Building to be seven storeys high, details later.

Board of Control has instructed F. C. Sullivan, Sparks street, to prepare plans and call for tenders shortly for the erection of a new fire hall on Arthur street to cost $25,000.

Owen Sound, Ont.

James Playfair, Midland, is contemplating a grain elevator of concrete and steel construction to replace old elevator destroyed by fire. Complete unloading and loading equipment will be needed, etc. Cost $100,000.

Plans are ready for garage and warehouse for Kilbourn Real Estate Co. Manager, Jos. Hemton. The firm will occupy premises of Owen Sound Pressed Steel Co. and will equip same with general automobile and repair shop. The garage will be equipped in the most modern manner.

Port Colborne, Ont.

By-law passed to grant concessions for steel and iron smelter plant to cost $1,000,000, for The Union Furnace Co., Buffalo, N.Y. Subsidiary owner, Canadian Furnace Co. of Port Colborne. President, F. B. Baird, Buffalo. Company will build a modern steel and iron smelter.

Renfrew, Ont.

I. E. Pedlow will have old stores on Raglan street demolished and a new department store erected on the site.

Saskatoon, Sask.

The Laurentia Milk Co. of Toronto, contemplate building a large dairy plant near Saskatoon.

H. Sutton, sr., proprietor Empire Hotel, 2nd avenue, has taken out a permit for the erection of addition to the hotel to cost $80,000.

Plans are being prepared for offices and stores, 2nd avenue near 22nd street, for Martin & Hargreaves. 4-storey, concrete facings, steam heating, electric lighting.

Dr. Stewart is planning to erect stores and offices on 2nd avenue. Architect, Brown & Vallance, Montreal. 3-storey, reinforced concrete and brick construction, terra cotta facing, vacuum steam heating, 25 ft. front.

Plans are being prepared for offices and stores for Saskatoon Investment & Trust Co., Saskatoon. 3-storey and basement, 50 x 90, concrete foundation, reinforced concrete, brick and stone trimmings, steam heating, electric ltg. Foundation to be started at once.

St. Mary's, Ont.

Plans are ready for erection of stores for Charles [illegible] 1-storey, [illegible] foundation, brick and fireproof construction, steam heating, electric lighting. Complete equipment for 3 stores, electric fixtures and plumbing will be required.

Thamesford, Ont.

W. Clark, Newcastle, Ont., is seeking a site and will build a large new evaporator. The latest equipment and machinery will be required. Cost $7,000.

Toronto, Ont.

Tenders are called for stores and 2 residences for H. W. Sharp, 19 Adelaide street E. Architect, J. G. Hedges, 34 Yonge street. Received by owner with the exception of masonry and carpentry.

Tenders are called for stores and residences for H. W. Sharpe, 19 Adelaide street E. Architect, J. G. Hedges 34 Yonge street. All tenders except masonry and carpentry.

Tenders are open for foundry to cost $6,000, Junction road, for Gurney Foundry. Architects, Ellis & Connery, 72 Queen street. One storey, brick, concrete foundation, cast iron, electric lighting, galvanized iron, tar and gravel roofing.

Walkerton, Ont.

Saddlery & Steel Goods Co. are contemplating the erection of a new factory.

Walkerville, Ont.

Fred White will shortly build a private garage. All modern equipment will be required.

Plans are in preparation for foundry on Walker road, for The Kerr Engine Co. Architect, Crane & Pennington, Windsor. 1-storey, 130 x 20, concrete foundation, brick and reinforced construction, concrete and composition rfg.

Welland, Ont.

Plans are being prepared for business block, cor. Helen's avenue and Regent street, for James Hughes. Work will start immediately.

Windsor, Ont.

Plans are in preparation for stores and flats to cost $15,000, Pellissier street, for A. T. Currale. 4-storey, 33 x 58, brick foundation, brick construction, steam heating, electric lighting, composition roofing, Georgia pine flooring.

Winnipeg, Man.

Laing Bros., 307-309 Elgin avenue, have an application before the council to erect a corrugated storage shed 54 x 70, 1-storey, and adjoining their present stable.

The A. B. Ormsby Co. are applying for a permit to erect a corrugated iron storage shed, 50 x 66, 1-storey high in the rear of their present building on Notre Dame street.

CONTRACTS AWARDED

Brantford, Ont.

Factory to cost $140,000 on Greenwich avenue, for American Radiator Co. Mgr. J. D. Kelly. Architect, John E. Youngsbery, Chicago, Ill. General contractor, E. H. Secon & Sons, Ltd., Brantford. Foundry 112 x 104, 1-storey, [illegible] 64 x 94, cupola 40 x 58 x 30, brick and steel. Assembling and machine rooms, [illegible] x 277. To be rebuilt, boiler house, fan house, engine room. Plumbing done by the general contractor. Heating by by American Radiator Co. Lighting and sprinkling systems required.

(Continued on page [illegible])

Tenders and For Sale Department

To Architects and Engineers

[illegible] puts in a tender must see your [illegible] first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works [illegible]

Send along your plans when asking for tenders put a line in your advertisement to that effect. No extra charge is made for filing plans at [illegible] offices.

Contract Record and Engineering Review

Montreal—[illegible] Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

Superintendent of Light and Power Department Wanted

Applications will be received by the undersigned on behalf of the City of Fernie, B .C., up to the **22nd day April, 1912**, for the position of Superintendent of Light and Power Department. Applicants to state experience, qualifications and salary required. Duties to commence May 1st, 1912. · Reply,

S. W. BARCLAY, City Clerk,
15-16 Fernie, B. C.

Tenders for Bridge Construction

Tenders will be received at the office of the undersigned up to twelve o'clock noon on **Tuesday. April 23rd, 1912**, for the construction of Concrete Abutments and Concrete Floors for the following bridges:

1. Malton Bridge, over the Mimico Creek on the town line between the Counties of York and Peel near the village of Malton, for the Counties of York and Peel.
2. North Woodbridge Bridge, over the Humber River, on the County Road in the Township of Vaughan near the Village of Woodbridge, for the County of York.
3. Cockburn's Bridge, over the Humber River on the road between lots 15 and 16 Con 7, in the Township of Vaughan, in the County of York, for the Township of Vaughan.

Plans and Specifications may be seen and all information may be obtained at the office of the undersigned, 57 Adelaide street east, Toronto.

FRANK BARBER,
Civil Engineer.
Toronto, March 22, 1912. 15-16

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 382, Winnipeg. 11-23

For Sale

New 500 B. H. P. Mirrlees-Diesel crude oil engine, 200 R.P.M. delivery six weeks. Guaranteed fuel consumption full load 0.45 lbs. b.h.p. hour. Apply, Heaps Engineering Company, Limited, 445 Hastings Street, Vancouver, B.C. 16

CITY OF STRATFORD

Tenders will be received until 5 p.m., **April 22nd, 1912**, for approximately 32,000 square yards of pavements. Specifications and particulars may be had on application. Lowest or any tender not necessarily accepted.

M. FERGUSON,
15-16 City Engineer.

Moose Jaw Public Library Board

TENDERS

Sealed tenders addressed to the undersigned will be received up to 4 p.m. on **Wednesday, April 24th, 1912**, for the erection of a Public Library Building in Crescent Park in the City of Moose Jaw.

A marked cheque for five per cent. (5 p.c.) of the amount of the tender must accompany each bid.

Plans and specifications and all information may be obtained from Messrs. Reid & McAlpine, Architects, Howden Block, Moose Jaw.

The lowest or any tender not necessarily accepted.

W. F. HEAL,
Secretary Public Library Board.
Moose Jaw, March 28, 1912. 15-16

CITY OF EDMONTON

Tender for Tunnel Sewer

Sealed tenders will be received by the undersigned up to 6 o'clock **April 30th, 1912**, for the construction of a Reinforced Concrete Tunnel Sewer.

Envelopes containing tender must be marked "Tender for Tunnel Sewer."

Specifications and forms of tender may be obtained at the office of the City Engineer, Edmonton.

Specifications may also be seen at the office of the Contract Record and Canadian Engineer.

A deposit of ten ($10.00) dollars will be required for each set of specifications and plans.

All tenders must be accompanied by a certified cheque for one per cent. (1 p.c.) of the value of the contract.

The right is reserved to accept or reject any or all tenders.

CITY COMMISSIONERS,
Edmonton, Alta., March 23, 1912. 14-16

Notice to Contractors

Alternative tenders for brick and concrete will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on **Tuesday, April 23rd, 1912**, for the construction of Storm Overflow Sewer, Main Garrison Creek, Section No. 1.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

Tenderers shall submit, with their tender, the names of two sureties, or in lieu of sureties, the Bond of a Guaranty Company, approved of by the City Treasurer.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.

City Hall, Toronto,
April 9th, 1912.

Contractors' Plant For Sale

Consisting of:—

3 complete Derricks (one stationary),
1 50 h.p. Locomotive Boiler.
2 40 h.p. Locomotive Boilers.
3 "Leonard" Engines, 7, 20 and 25 h.p.
1 18 h.p. Rocker Arm Engine.
2 No. 2 Ransome Concrete Mixers, complete with Boilers and Engines—with wheels to run on track.
1 15 h.p. "Marsh & Henthorn" Hoist.
1 20 h.p. "Manson" Hoist.
1 No. 5 "Smart Turner" Centrifugal Pump, direct connected, complete with suction and fittings.
1 8-in. "Gould" Centrifugal Pump, direct connected with 10-in. suction, complete with fittings.
1 8-in. "Gould" Centrifugal Sand Pump, direct connected with 8-in. suction, complete with fittings.
1 4 x 6 in. Martin Duplex Pump.
1 7½ x 7½ in. Martin Duplex Pump.
2 Small Duplex Pumps, 2½ in. suction.
2 No. 2 McDougall Diaphragm Pumps.
2 20 h.p. Upright Boilers.
1 No. 5 Ohio Hopper Vertical Gas Engine with fittings.
1 Wilson Flare Light.
1 Milburn Flare Light.
31 Gasoline Torches.

Band saw, forge, anvil and fittings for blacksmith and carpenter shop.

A number of 1½ and 1¼ c. y. side dump cars; "Koppel" ¾ c. y. steel cars, all 24-in. gauge.

1 Water tank 7 ft. dia. and 7 ft. high, with fittings.

A large quantity of shafting, sprocket wheels, belting, scrapers, wagons, tools, etc.

Information and prices at
Room 1307 Traders Bank Bldg., TORONTO.
Telephone Main 7123

City Engineer Wanted

Applications will be received by the undersigned up till twelve noon on **Thursday, the ninth day of May, 1912,** for the position of City Engineer of North Vancouver.

Applicants to state experience, qualifications and salary expected.

THOMAS SHEPHERD,
City Clerk,
North Vancouver, B.C.

16-19

CITY OF MOOSE JAW
SASK.

Tenders for Subway

Sealed tenders, marked "Tenders for Subway," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon on **Tuesday, April 30th, 1912,** for the construction of a Reinforced Concrete Subway under the Canadian Pacific Railway Company's tracks on Eleventh Avenue.

Plans, specifications and any further information may be seen at the office of the "Contract Record," 220 King Street West, Toronto.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. H. HEAL, City Commissioners.
Moose Jaw, April 6th, 1912.

Department of Railways and Canals, Canada

Saulte Ste. Marie Canal

Notice to Contractors

Sealed tenders addressed to the undersigned and endorsed "Tender for widening Lower Entrance Channel-way, Sault Ste. Marie Canal," will be received at this office until 16 o'clock on **Friday, May 10th, 1912.**

Plans, specifications and form of the contract to be entered into, can be seen on and after the 10th of April, 1912, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Engineer in Charge, Sault Ste. Marie, Ont., at which places form of tender may be obtained.

Parties tendering will bbe required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $2,500 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,

L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, April 8th, 1912.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.—21126.

Laying Sewer Pipe

Tenders will be received by the Town of Southampton until **May 1st next** for laying 500 ft. of 15-in. sewer pipe along the lake shore. For further information apply to

BOWMAN & CONNOR,
Civil Engineers,
Berlin, Ont.

16

Canadian Pacific Railway Company

Department of Natural Resources

Tenders for Timber Structures

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Timber Structures," will be received up to **noon of May 15th, 1912.**

The work to be let includes the timber structures in about half the area of the Eastern Section of the Company's Irrigation Block in Alberta.

Approximate quantities are 4,250,000 feet B.M. of timber and 80,000 cubic yards of excavation. All construction materials will be furnished by the railway company.

Plans, specifications and full information will be furnished on application to the undersigned. A deposit of $50.00 will be required before plans, etc., will be given out, which will be refunded on their return in good condition.

All proposals must be accompanied by a certified cheque, payable to the undersigned, for five per cent. (5 p.c.) of the amount of tender, to be forfeited as liquidated damages should the the bidder neglect or refuse to enter into a contract if the work is awarded to him.

All proposals must be made on the standard form provided or they will not be considered. Any alterations thereto, interlineations or qualifying of prices may invalidate the proposal.

The right is reserved to reject any or all bids and to waive defects.

A. S. DAWSON,
Chief Engineer.
Calgary, Alta., April 15, 1912.

16-18

SEALED TENDERS, addressed to the undersigned and endorsed "Tender for One Single Screw Steel Tug," will be received at this office until 4.00 p.m,. on **Monday, April 22, 1912,** for the construction of an 80 ft. Single Screw Steel Tug.

Plans, specifications and form of contract can be seen and forms of tender obtained on application at the offices of J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.; J. L. Michaud, Esq., District Engineer, Merchants' Bank Building, Montreal, Que.; G. G. Scovil, Esq., Supt. of Dredges, St. John, N.B., and G. M. Graham, Esq., Supt. of Dredges, New Glasgow, N.S.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering declines to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, March 29, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.

16

Bridge Tenders

Tenders will be received by the County of Waterloo until **April 27th next** for a new bridge over the River Nith, one mile north of New Hamburg:—

(a) 110 ft. steel span.
(b) Concrete abutments.

For specifications, etc., apply to

BOWMAN & CONNOR,
Civil Engineers,
Berlin, Ont.

16

CITY OF REGINA
SASKATCHEWAN

Sealed tenders for the following apparatus and supplies will be received by the City Commissioners, City of Regina, up until noon of the **20th of April, 1912,** for sections **1** to **5**, and up until noon of **May 15th, 1912,** on sections 6 to 9.

Section 1.—Poles, cross arms, side brackets, top pins.
Section 2.—Pole line hardware.
Section 3.—Copper wire.
Section 4.—Transformers.
Section 5.—Meters.
Section 6.—Luminous arc, street lighting equipment.
Section 7.—Street lighting poles, metal.
Section 8.—Draught fan.
Section 9.—400 kw. d.c. generating unit.

Tenders will be received for the whole or any section of this work.

The lowest or any tender not necessarily accepted. The City reserves the right to waive any irregularities in any tender.

Specifications for any or all of these sections may be had on application to the

CITY ELECTRICIAN,
Regina, Sask.

5

Department of Railways and Canals

Ontario—St. Lawrence Canals, Cornwall Canal

Sealed tenders, addressed to the undersigned and endorsed "Tender for Improving Lower Entrance to Lock No. 15," will be received at this office until 16 o'clock on **Friday, April 26th, 1912.**

Plans, specifications and form of Contract to be entered into can be seen on and after April 8th, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $6,500.00 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,

L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, [illegible]

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

TENDERS

For Drainage Work

Stanley Township

[illegible] Work [illegible] May 11 1911, [illegible] will be received [illegible] May 15th, 1912 [illegible]

JOHN E. HARNWELL,
Clerk of Stanley Township,
16-18 Varna, Ont.

CITY OF TORONTO

Main Drainage Works

Sealed tenders, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of **Tuesday, April 23rd, 1912**, for the construction of Sections Nos. 10 and 11, High Level Interceptor. The former comprises the construction of 3,890 lineal feet, and the latter 2,930 lineal feet of 4 foot 6 inch diameter circular brick sewer.

Plans, specifications, forms of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
15-16 Chairman, Board of Control.

CITY OF SASKATOON

Tender for Superstructure 23rd Street Subway

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Superstructure 23rd Street Subway," will be received up to twelve o'clock noon on **Friday, May 17th, 1912**, for furnishing material for and construction of Superstructure 23rd Street Subway.

The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to W. L. MacKenzie, Bridge Engineer, C. N. R., Winnipeg, and George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL,
E. M. SNELL, City Commissioners.
Saskatoon, April 9th, 1912. 16-17

The City of Fort William

Garbage Incinerator

Tenders sealed and endorsed "Tenders for Garbage Incinerator," and addressed to the Chairman of the Works Committee will be received on or before the **15th** day of **May, 1912**, at the office of the City Clerk, for the complete installation, including all buildings, of a fifty (50) ton incinerator plant and the operation of same for a period of three months after completion.

Forms of tender, on which all bids must be submitted, may be obtained from the office of the City Engineer.

A cash deposit of ten per cent. of the cost of the plant will be required, and same will be returned to the contractors on the completion of the three month period of operation.

The lowest or any tender not necessarily accepted.

JOHN WILSON,
City Engineer.
Fort William, April 11, 1912. 16-19

Parsons Trench Excavator For Sale

Will excavate trench 28 to 78 inches in width up to 20 feet deep. Also has special frame and equipment for trench 22 inches in width up to 14 feet deep. In good condition and well supplied with extra parts.

J. H. McKnight Construction Company, Ltd.,
15-17 Toronto, Ont.

Tenders Wanted

Sealed tenders for the erection and completion of an Eight-room School Building at Grandview will be received up till 6 o'clock p.m., **Tuesday, April 30th, 1912.**

A marked cheque, equal to 5 per cent. of the bid, must accompany each tender.

Plans and Specifications may be seen at the office of the Architects,

TAYLOR & TAYLOR,
Hope Chambers,
Brantford, Ont.

All tenders shall be marked "Tender" and addressed to Geo. W. Alderson, Sec.-Treas. S. S. No. 3, Brantford Township, Grandview P. O.

Lowest or any tender not necessarily accepted.

Brantford, April 15, 1912. 16

CITY OF EDMONTON

Tenders for Nelson Ave. Trunk Sewer

Sealed tenders will be received by the undersigned up to 6 o'clock, **April 30th, 1912**, for the construction of a Reinforced Concrete Sewer.

Envelopes containing tenders must be marked "Tender for Trunk Sewer."

Specifications may also be seen at the Toronto offices of the Contract Record, the Canadian Engineer, Toronto, and the Engineering News, New York.

A deposit of ten ($10) dollars will be required for each set of specifications and plans.

All tenders must be accompanied by a certified cheque for one per cent (1 p.c.) of the value of the contract.

The right is reserved to accept or reject any or all tenders.

CITY COMMISSIONERS,
Office of the City Engineer,
Edmonton, Alta., April 2, 1912. 15-17

Business Buildings and Industrial Plants

(Continued from page 69)

Calgary, Alta.

Store to cost $4,000 for G. Herbert, 102 7th street N.E. General contractor, P. Engleman, Bridgeland. 2-storey, 24 x 41, concrete foundation, frame, ruberoid roofing, hot air heating, electric ltg.

Plans are ready for stores and rooms to cost $12,000, Sunnyside avenue, for G. W. Rea, 1119 5th avenue west. Architect, A. Pirie, 8th avenue west. 2-storey, 50 x 60, concrete foundation, brick veneer, electric lighting, steam heating. Contractor is owner.

Carleton Place, Ont.

Contract is awarded for stove foundry for Findlay Bros. Co. Ltd. 3-sty., 158 x 70, brick, reinforced concrete and two smaller buildings of 1-storey each, 28 x 40, and 216 x 60.

Guelph, Ont.

Plans are ready for office building to cost $20,000, for B. G. Gummer. General contractor, Johnston & Williams, Guelph. 4-storey, brick construction, steam heating, electric lighting. Complete new equipment, elevators and latest furnishings required.

Hamilton, Ont.

Hotel addition, cor. York and Park streets, for J. Goldberg. Commercial Hotel. General contractor, Anse Bresett, 50 East avenue N. New kitchen and dining room will be added. Turn livery stables into stores, make office and other improvements.

Excavation has started on apartments and stores on Barton street on east of Victoria avenue, for W. E. Goring, 211 Herkimer street. Architects, Stewart & Witton, 2 Hughson street S. 3-sty. and basement. Masonry, W. H. Cooper, 197 Emerald street N. Carpenter, 280 Sanford avenue N. Plastering, J. Clapham & Son, Main street west. Steel work, Hamilton Bridge Works Co.

Factory to cost $14,000, James and York streets, for McGivern Estate. Occupants, Duncan Printing Co. General contractor, Yates & Randall, 68 Wentworth street N. Carpentry, R. A. Nicholls, 229 Catherine street N. Sewers, J. J. Armstrong, 48 Burris street. Tar and gravel roof; plumbing and heating not let yet.

Kentville, N.S.

Bank to cost $25,000 for Royal Bank of Canada. Architect, Kenneth J. Rea, 54 Beaver Hall Hill, Montreal. Contractors, Faulkner & McDonald, Halifax, N.S. Two-storey, 30 x 45, brick, brick and stone trimmings, concrete foundation, upper floor to be turned into offices. Branches will also be erected at Wolfville, N.S., Sydney, N.S., Yarmouth, N.S., New Glasgow, N.S., and Sault Ste. Marie, Ont.

Merritton, Ont.

Contract is awarded and work has started for the Interlake Paper Company. Architect, D. J. Albertson, Kalamazoo, Mich. General contractor, Bishop Construction Co., Toronto 2-storey, 208 x 70, reinforced concrete, steel and brick, concrete foundation, steam heating, electric lighting, composition roofing, wood and concrete floors, sprinkler system, motors, wood and concrete floors, motors, electrical work and boilers, engines, factory and mill machinery and freight elevators required.

Montreal, Que.

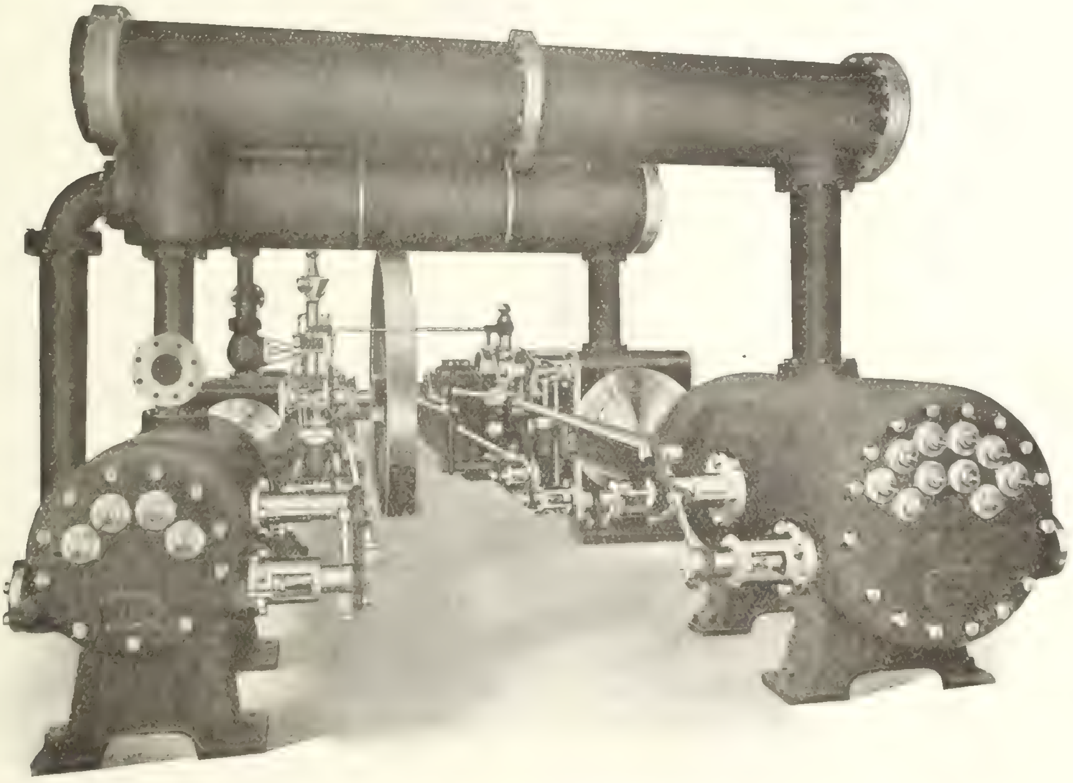
Stores and houses to cost $35,000, Beaubien and St. Dominique, for Rosario Dery, 41 Beaubien. General contractor, J. H. Blais, c/o 41 Beaubien. 3-storey, 24 x 50, concrete foundation, brick encased and stone trimming, gas and electric light, gravel roofing.

Storage and wash house, St. Paul st., for National Breweries Ltd., 36 Chaboillez street. Architect, Cox & Amos, 112 Mansfield street. General contractor, Church & Ross, 40 Hospital street. 2-storey, 65 x 90, concrete construction, steam heating, electric lighting, roof cover.

Warehouse, Lachine Canal, for Dominion Steel Corporation, Sydney, C.B. Montreal representative, Mr. McKenzie, 112 St. James street. Architect, Proprietors Staff. General contractors, Byers & Anglin, Ltd., 65 Victoria street, Montreal.

AIR COMPRESSORS

Quality - Prompt Delivery - Right Prices



Air Compressor built for National Transcontinental Railway, Winnipeg, Man.

Boilers, Engines, Penstocks, Water Towers, Steel Tanks
Heavy Plate Work, Condensers, Air Compressors,
Pumping Machinery

Let our representative tell you about "INGLIS" PRODUCTS.

The JOHN INGLIS COMPANY Limited

Engineers and Boiler Makers

14 Strachan Avenue - - TORONTO, Canada

Wooden Water Pipe

Galvanized Wire Wound and Continuous Stave Pipe for Water Works, Power, Irrigation, etc.

Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquiries.

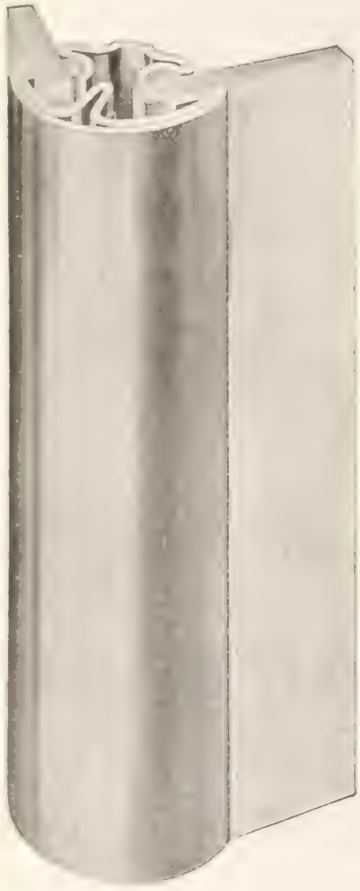
Write for prices.

Manufactured by

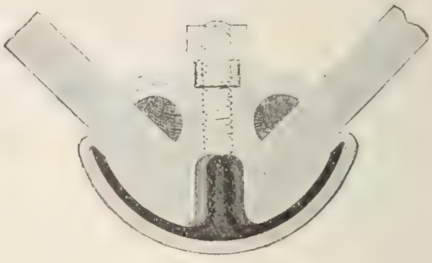
Canadian Pipe Co., Limited

P.O. BOX 915

Factory: 550 Pacific St., VANCOUVER, B.C.



The Hester Corner Bar



No. 10

The One Perfect Bar

This is the only bar on the market that adjusts itself to any angle. Note the firm, even grip it takes on the two plates, and the self-adjusting half round moulding held in place by the inside copper stop, makes the bar a perfect fit for any angle.

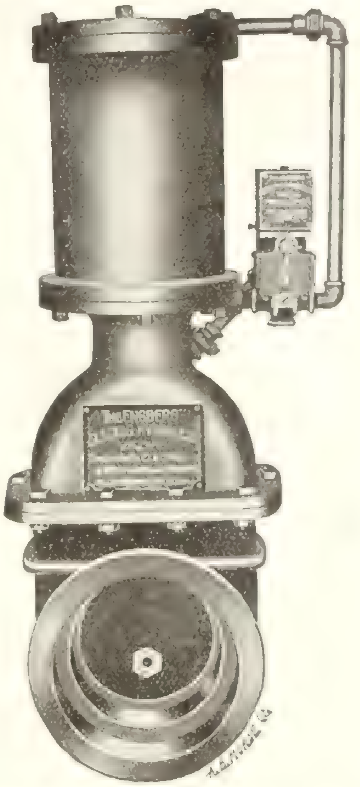
Write for our catalog giving full description.

The complete Hester System of Metal Store Fronts, manufactured by the

Canadian Store Front Company

Queen and Peter Streets, HAMILTON, ONT.

The "ENGBERG" VALVE



A VALUABLE ADJUNCT

No waterworks system, having a standpipe or reservoir, can afford to be without this valve, a most valuable adjunct, increasing the effectiveness when fire pressure is desired and permitting a reduction in the cost of maintaining ordinary domestic pressure.

We are sole agents for Canada.

Read what a Fire Chief says—

"Your electric shut-off valve has been a great assistance to us in putting out fires, as it enables the engineer at the pumping station to increase the water pressure in an instant, whereas it took from twenty to thirty minutes to change before the same was put in; a man having to go to the stand pipe and close the valve and also telephone to the engineer notifying him of the same. Now it is all done at the pumping station, and by the time we are able to make connections we have direct pressure. Any chief knows what it means to try and fight fire without sufficient water pressure."

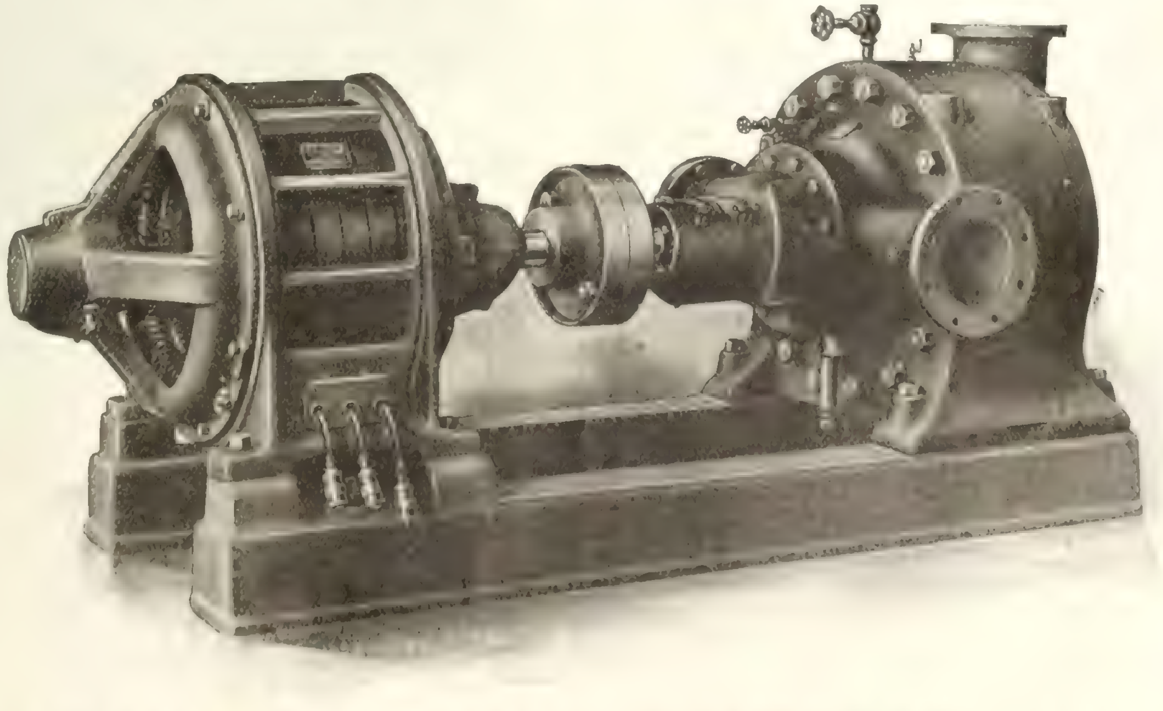
THE JOHN McDOUGALL CALEDONIAN IRON WORKS CO.

LIMITED

WORKS—
William and Seigneurs Streets, MONTREAL

SALES OFFICE—
Montreal, Toronto, Winnipeg, Cobalt, Calgary, Vancouver

Electrically Operated Turbine Pumps for All Duties



CANADA FOUNDRY COMPANY, Limited

TORONTO MONTREAL HALIFAX OTTAWA COBALT WINNIPEG CALGARY VANCOUVER NELSON

REVERSIBLE
10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line **2,600 Lbs.**
On a Double Line will Lift. **5,200 Lbs.**

160 Feet per Minute
80 Feet per Minute

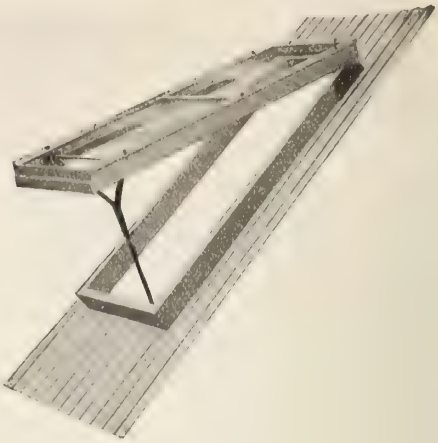
Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

Weight with Boiler, 4,000 lbs; without Boiler, 2,400 lbs. Light enough to be moved about easily.

Length over all, 5 ft. Width over all, 5 ft. 10 in. This Engine is also made non-reversing, at a reduced price and weight. Made with One Drum or Two Drums.

Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal



Cheap
and
Practical

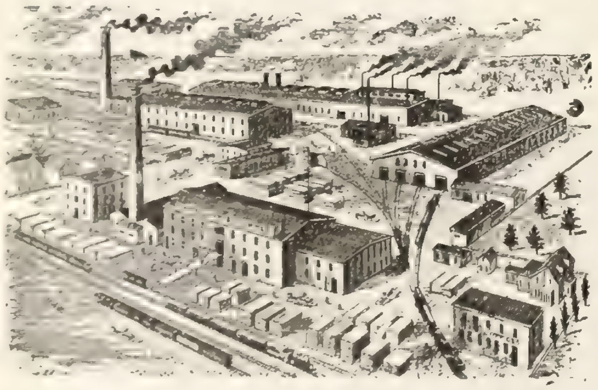
The New Skylight
Acheson
Barn Roof Lights

attached like an ordinary sheet of corrugated iron —no soldering nor flashing. Moveable or stationary sash, plain or wired glass. Made for corrugated iron or any other form of roofing.

Write for prices and full particulars

The Metallic Roofing Co., Ltd.
MANUFACTURERS
Toronto, Ont. **Winnipeg, Man.**
(C-83)

Rhodes, Curry Co., Limited
Lessees



Bank and Office Fittings
SCHOOL DESKS A SPECIALTY

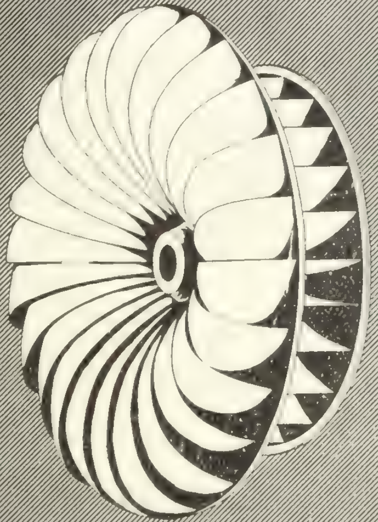
We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. **Amherst, N. S.**
BRANCHES AT
Halifax Sydney

IRON STAIRS
Dennis Wire & Iron Works Co.
London, Canada **Limited**
Toronto Offices - 12 QUEEN STREET E.

EWC



WATER POWER

ESCHER-WYSS

HEAD OFFICE FOR CANADA:
Lumsden Building, TORONTO
Agents:
B. C.—Frank Darling & Co., Vancouver
Prairie Prov.: C. L. Trimingham, Winnipeg

This Fountain is Waterproofed With Ceresit

Fountain in the Country Life Gardens, Garden City, Long Island, N.Y.

Ceresit is a cream white paste which is dissolved readily in the water used in mixing concrete or cement mortar. By this method the Ceresit is uniformly distributed through the aggregates, thus filling the voids and giving greater density and strength to the concrete and mortar, and rendering it absolutely impervious to water or dampness even when subjected to great hydrostatic pressure.

"Ceresit" Waterproofing

Ceresit acts as a protector to concrete and cement—by keeping the materials dry it prevents disintegration by frost.

Ceresit itself cannot crack or be chipped off as it is an integral part of the mass. It therefore has a quality of permanence not possessed by mere coatings or paints, which at best are cheap substitutes that prove costly in the final test of time. Ceresit is economical in labor, requiring no extra mechanical apparatus or mixer. Ordinary workmen can mix Ceresit by the simple directions that always accompany the product.

Ceresit does not darken the concrete or cement, but it does give it strength. We guarantee Ceresit to be an efficient waterproofing for any job we undertake and direct, and to prove our faith we will put up a cash bond if needed.

CERESIT WATERPROOFING CO.

Commercial Bank Bldg., CHICAGO

Ceresit Factories are located in Chicago, Unna Westphalia Germany, London, Paris, Vienna, St. Petersburg

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Eadie Douglas Ltd., 65 Victoria St., Toronto
Eadie Douglas Ltd., 81 Bank St., Ottawa
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Canadian Equipment & Supply Co., 416 Pacific Bldg., Vancouver
Carritte Paterson Co., Ltd., St. John, N.B.
E. F. Stevens, 16 Prince St., Halifax, N.S.

Agents wanted in unoccupied territory

All we ask is that you give **Ceresit a fair trial. It will not disappoint the most exacting architect, engineer, contractor or owner.**

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REMINDER

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Ceresit Waterproofing Co.
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CHICAGO

TANKS

for

Pulp and Paper Mills
Chemical Works
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We also build

Steel Structures

to support them.

Write us for quotations

MacKinnon, Holmes & Company Limited
SHERBROOKE, QUE.

Municipal Filtration and Water Softening Plants

Designed,
Installed and
Operated
by Experts

We GUARANTEE
Results under all
Conditions

Write us for our "Red Book" on Water Softening and Purifying

Messrs. The Paterson Engineering Co.

Canadian Agents:

LAURIE & LAMB

Board of Trade Building, MONTREAL

Lap Welded Steel Pipe
MADE IN SIZES
12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.
Ask our Welded Pipe Dept. for prices.

American Spiral Pipe Works
MANUFACTURERS OF
SPIRAL RIVETED PIPE LAP WELDED PIPE
FORGED STEEL FLANGES
50 Church St. New York Box 485 Chicago, Ill

Merriman One-Car Asphalt Plant
The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers
East Iron & Machine Company, Lima, O., U. S. A.

Crushed Stone
All sizes. For Roadways and Sidewalks also specially adapted for
Reinforced Concrete Construction
Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.
Phone Main 5377 or Write
Christie, Henderson & Co.
Limited
Head Office: 34 Yonge Street, TORONTO

EVERYTHING YOU WANT
in a Factory Site

Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

Maisonneuve, Que.

The Des Moines Hemispherical Bottom Steel Tanks and Towers
have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

Send for Catalog No. 15

Des Moines Bridge & Iron Co.
Pittsburg, Pa., U.S.A., 945 Curry Bldg.
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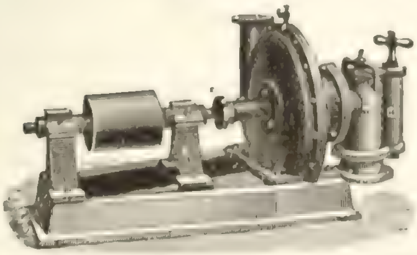
F. H. Hopkins & Company, Canadian Representatives, Montreal, Quebec

M. Beatty & Sons, Limited Welland, Ontario, Canada
Dredges, Ditchers, Derricks, Steam Shovels
Steel Dump and Deck Scows



Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery.

The Aristocrat Among Bricks

HAMILTON PRESSED BRICK

St. Clair Block, built of Hamilton Pressed Brick. Robert Clohecy, Architect.

The growing popularity of Hamilton Pressed Brick is due to its uniform color and quality. In our clay deposits we have the ideal material for brick making—clay rich in iron oxide. Our long experience and modern plant enable us to make the most of our raw material.

Always specify "Hamilton Pressed Brick"

Hamilton Pressed Brick Company

Limited

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Office 2931
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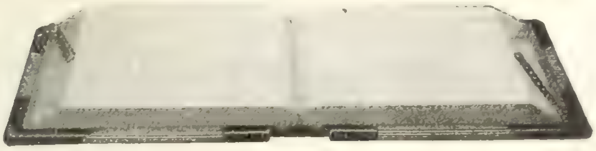
Spectator Building, Hamilton, Ont.

Toronto Representative, WALTER HUNTER, 105 MACDONELL AVE. Telephone Park 3170
Montreal, STINSON-REEB CO., Eastern Townships Bank Building.

"PROUDFIT" BINDERS

are essentially bound books with interchangeable leaves.



Flat opening with narrow binding margins.
Save 1½ inches in the safe, and 3 inches on the desk.
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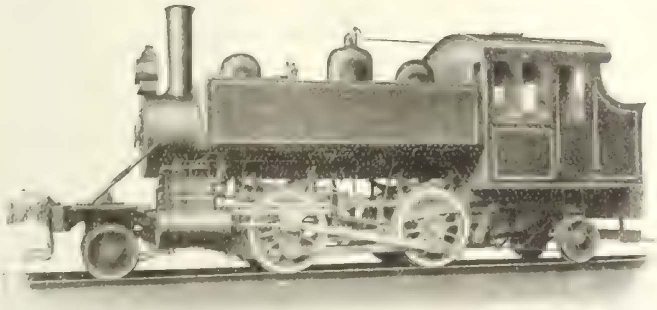

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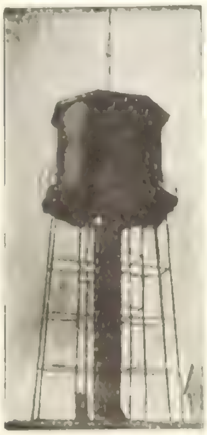

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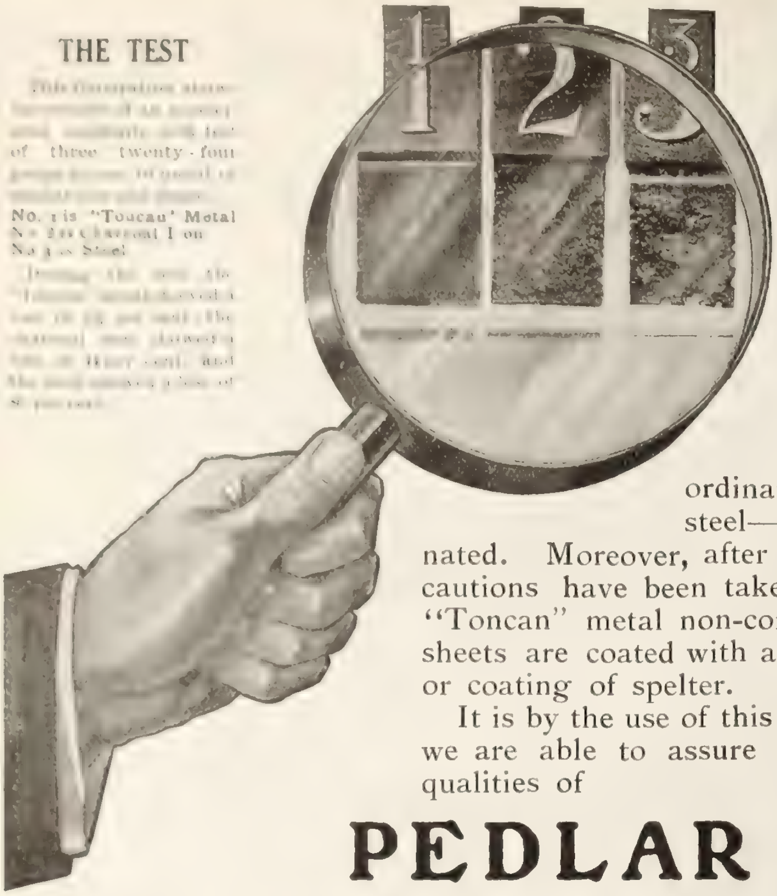

THE TEST

This illustration shows [illegible] of three twenty-four [illegible]

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No. 2 is Charcoal Iron
No. 3 is Steel

[illegible]

For Heavy Railroad Construction

The riveted type of Pedlar Perfect Culvert is made in "Toncan" metal which is 99.94% pure iron product. This means that in the process of manufacture, phosphorus, manganese, silican, sulphur and carbon—all the corrosive elements contained in ordinary iron and steel—are eliminated. Moreover, after all the precautions have been taken to make "Toncan" metal non-corrosive, the sheets are coated with a heavy film or coating of spelter.

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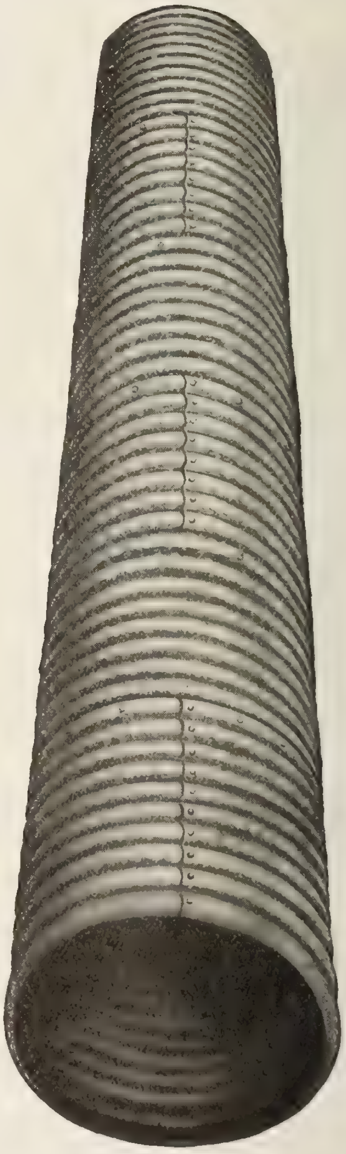

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TONCAN METAL

RIVETED CULVERT

Pedlar Riveted Culvert has lateral, narrow and deep corrugations of greater frequency than in any other length of culvert on the market. It is made to specifications for length, in sizes of an internal diameter from twelve to eighty-four inches. The lengths are in multiples of about twenty seven inches assembled.

The units are stoutly riveted at laps and seams and are delivered "built up" from the factory in the lengths required by specifications.

Joints between these units are made on the field by suitable sheet-metal coupling-bands reinforced with a girdling rod of a sectional area to suit the culvert's diameter. This makes an extremely rigid and non-sagging joint—a joint that is quickly completed and that resists the side pressure of filling dumped over the culvert from one side of the excavation.

Culverts may be graded, bedded and permanently placed with a few hours' labor.

Stock lengths of Pedlar "Toncan" Riveted Culvert may be carried at the supply yard and cut or pieced to fit with slight labor. They may be transported by flat car to the field and rolled into position after setting up.

On request we will also be glad to send Catalogue of Pedlar's Nestable Type Culvert. While of lighter construction than the Riveted Culvert, Nestable Culverts are entirely satisfactory for road boxes and other similar light work.

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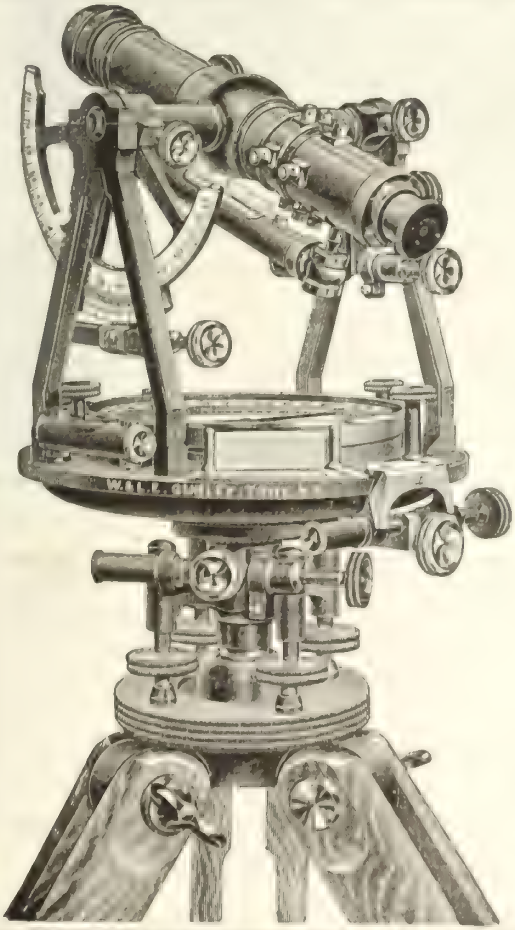
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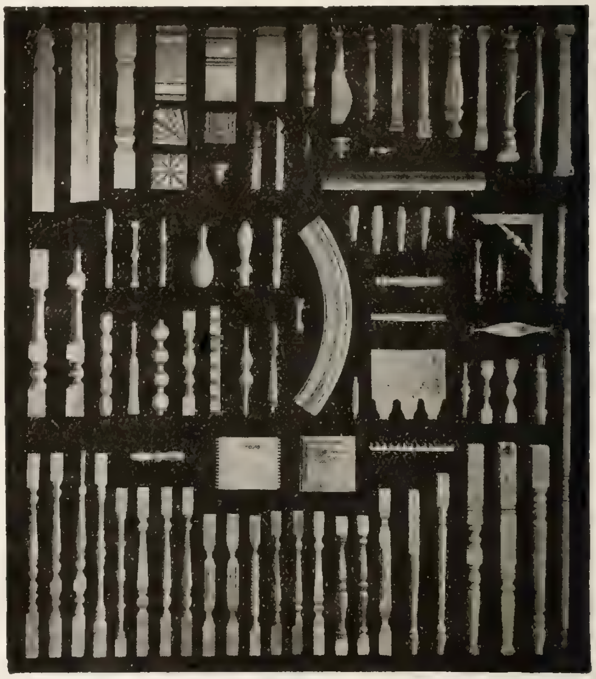

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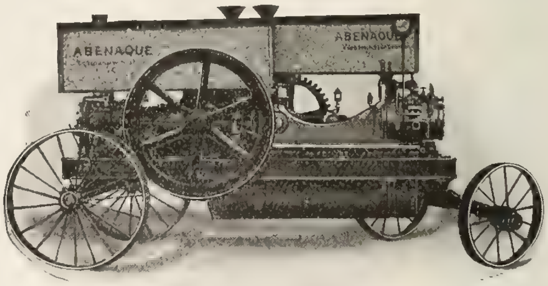

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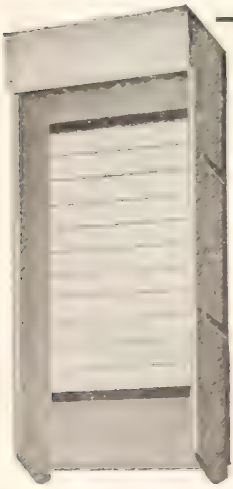

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No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$2.65	$4.05
40	2.85	4.50
50	3.25	4.81
60	3.45	5.50
70	3.75	6.32
80	4.25	6.87
85	4.70	7.70
90		9.07
96		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

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Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock .... net $1.75

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

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Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

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Pure White Lead, ground in oil, $7 per 100 lbs. per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 95c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 92c. per gallon of 9 lbs.

Turpentine, in barrels, 69c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

New Companies

Sheffield Investment Co., Ltd., has been incorporated with a capital of $40,000, to deal in all kinds of building material, with head office at Winnipeg. The incorporators are R. H. Goddard, N. H. Perry and A. M. Doyle, of Winnipeg.

The Swift Current Land and Development Co., Ltd., has been incorporated, with a capital of $30,000, to carry on a general land, lumbering and contracting business with head office at Winnipeg, Man. The incorporators are G. A. Maybee, of Moose Jaw, D. P. Smith and D. G. MacPherson, of Winnipeg, Man.

The Toronto Alberta Land Company, Limited, have been incorporated with a capital of $40,000, to carry on business as a general land and building company with head office at Toronto. The provisional directors are W. P. Gillespie, Toronto; C. R. Morden and E. S Fraser, of Niagara Falls.

La Compagnie de Maubles de Robertsonville, Limitee, have been incorporated with a capital of $49,900, to deal in all kinds of lumber and manage and establish mills for the purpose of sawing and manufacturing; the head office is at Robertsonville, Que., and the incorporators are A. Lambert, Dr. J. E. Fortin and A. Fillion, all of Robertsonville.

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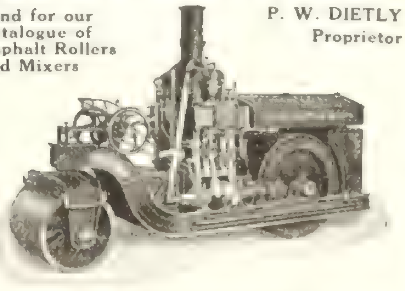

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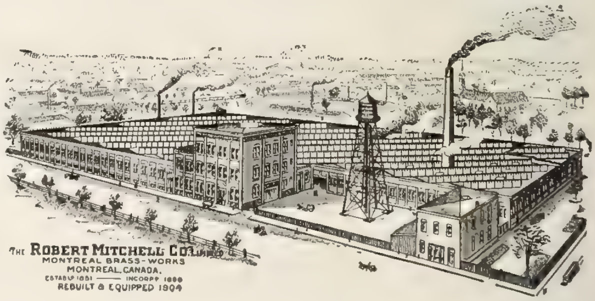
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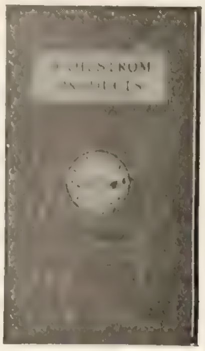
The Dahlstrom Products

A little booklet containing many interesting [illegible] the origination and perfecting of "metal interiors." It is agreed by [illegible] and [illegible], by many actual and [illegible] that no matter what precautions you take to fireproof a building, [illegible] it is not and cannot be "fireproof in reality." If inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.



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New Factory of CROWN FURNITURE CO. LTD., Preston, Ont. Roofed by us

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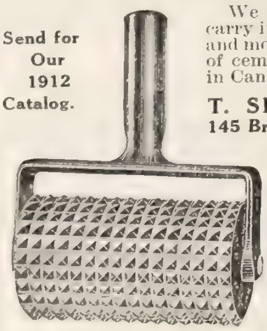

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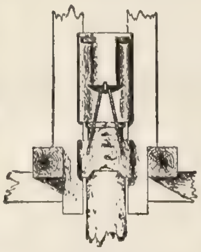
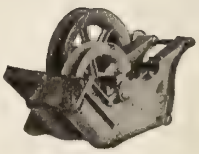
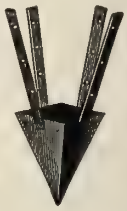


Casgrain Pile Cap



Perfect Head Block



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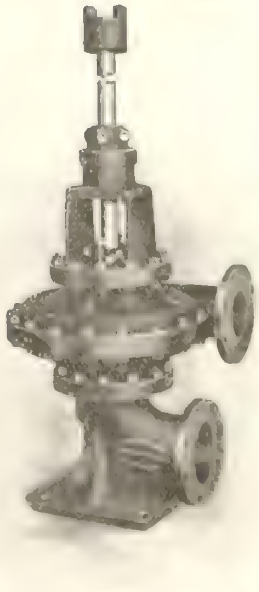

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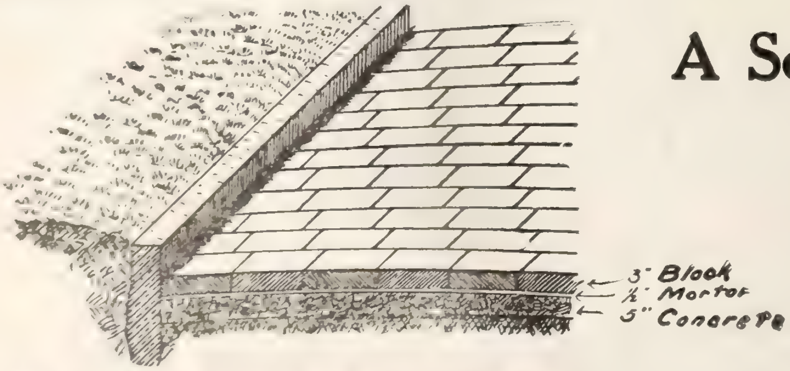

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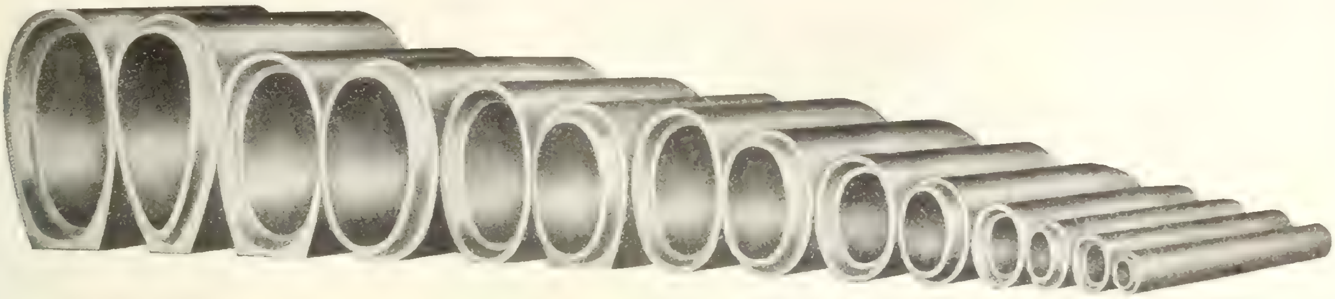

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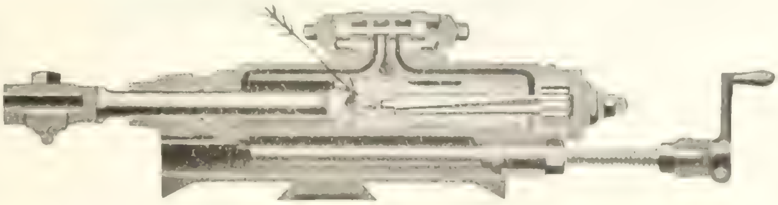
It has an air cushioning device on the end of the rifle bar.



It was found by exhaustive tests that a drill equipped with this device would use 25% less compressed air, and strike about 50% more blows per minute.

This cushioning device is a basic principle, patented.

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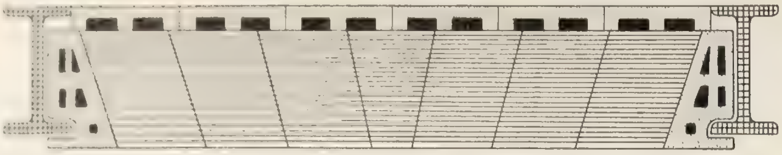

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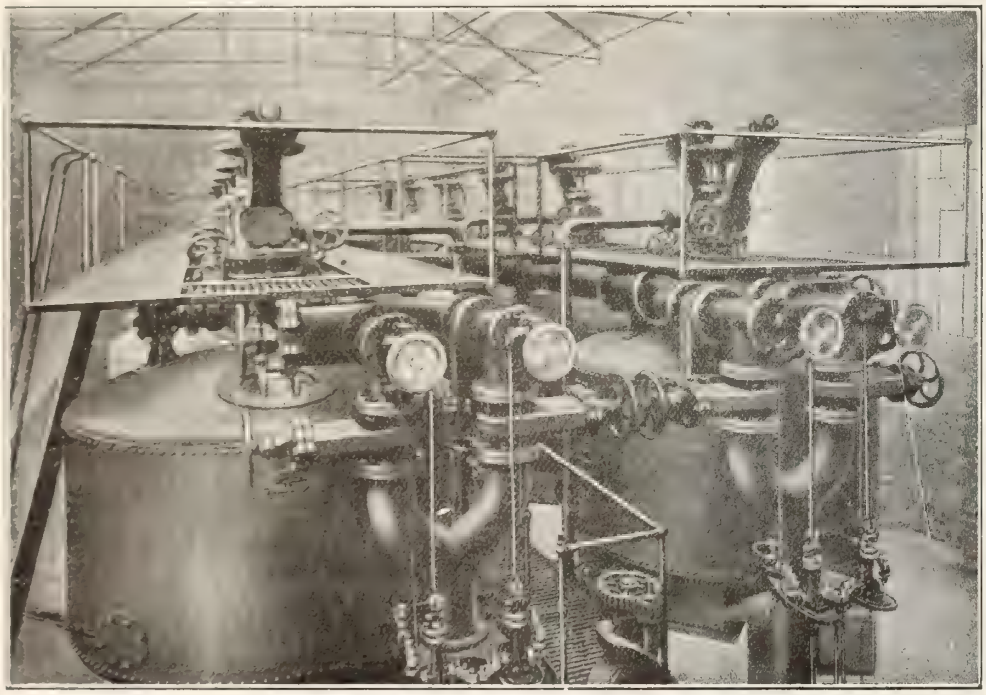

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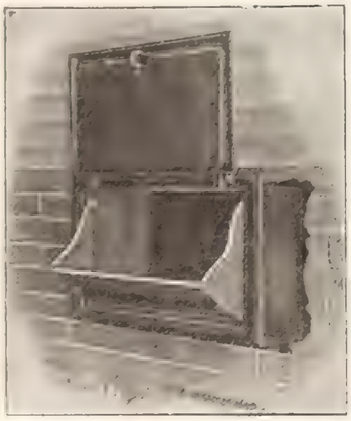

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1908	5,950,883
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1911	$17,550,000
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1909	9,226,325
1908	5,513,700
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1911	$24,374,539
1910	21,127,783
1909	18,139,247
1908	11,795,436
1907	14,225,800

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1910	15,715,859
1909	7,785,621
1908	5,062,226
1907	8,406,229

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Saves the extra freight and trucking expenses when bars are shipped bent. Handling and piling are facilitated at the job. Saves all bother and worry in case of change of plans.

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Plate Sheet Fancy

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Glazing Glass

The
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What Lime Do You Use?

Renfrew?

If you don't you are missing an opportunity of saving 75 cents a day on each bricklayer, and of laying 200 more bricks a day.

"RENFREW" Lime requires less time for tempering. Does not set so rapidly and allows the bricklayer to spread for more bricks.

**"RENFREW"
the Lime of Quality**

Jamieson Lime Co.

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Specializing in

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Specifications are invited from Architects and Engineers.

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Enquiries and correspondence respectfully solicited.

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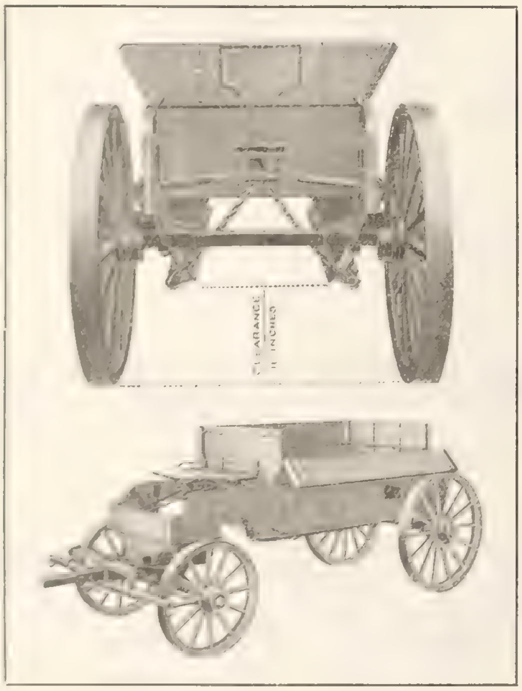

HERE'S a two-yard dumping wagon that's only 5 ft. 1½ in. high from ground to top of top box. Certainly low enough to shovel into with ease and economy. Much lower than most other wagons.

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And, one thing more: There is less weight on the rear axle of a Watson than any other dumping wagon. That means light draft. If you doubt this, get a tape line—measure any dumping wagon and prove it for yourself. We are making prompt shipments. Enough said.

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THE WORLD'S LARGEST DUMPING WAGON BUILDERS
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ALSO OFFICES IN
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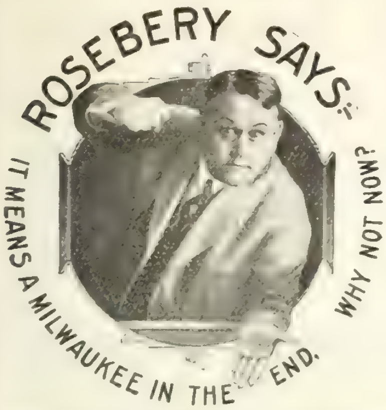
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IT MEANS A MILWAUKEE IN THE END.
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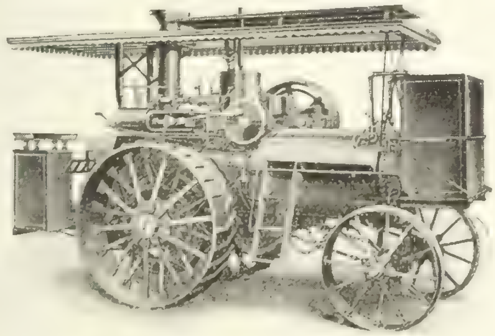

Shown here as traction engine, but quickly and easily convertible to a Road Roller. This combination makes a fine outfit for the road contractor. Two machines for but little more than the cost of either alone of other types.

Good for traction work, for rolling, and for belt work. Ask for catalog and full particulars.

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Canadian Representatives: F. H. Hopkins & Co., Montreal.

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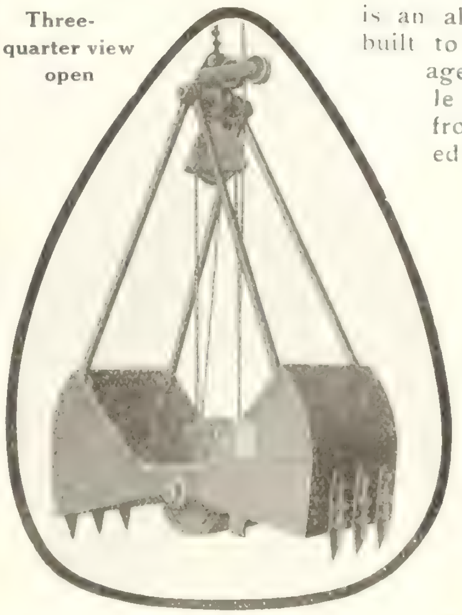
Owen Bucket



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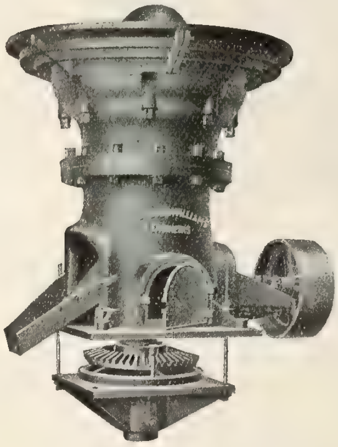

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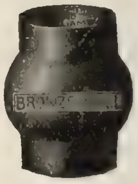

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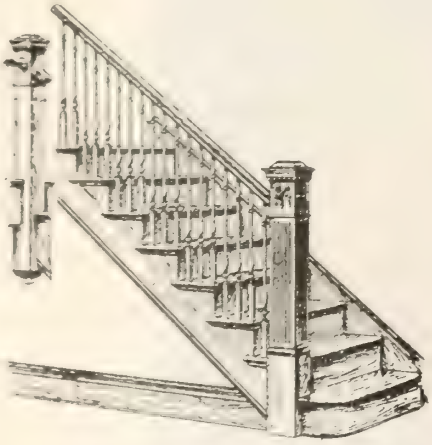

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Address
Please send information and price on Derricks for Handling Sand
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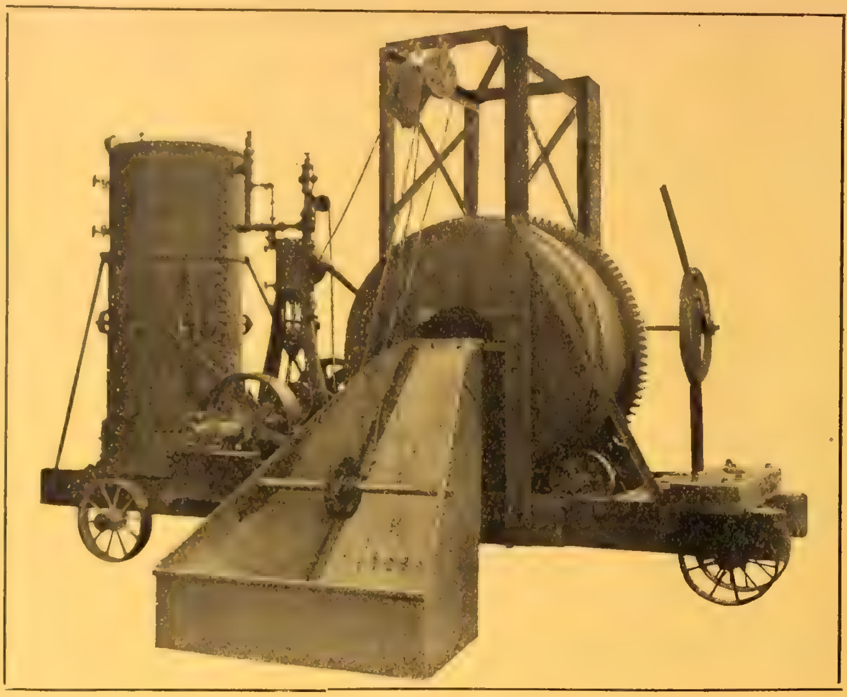

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When buying a Concrete Mixer

Its not the first cost

But the ultimate cost that counts

You can undoubtedly find many concrete mixers whose first cost is less than the Ransome—but is their ultimate cost less? That's the point.

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Our Ransome Mixer is the most reliable, efficient and durable mixer on the market. Simple in construction—repair bills are practically nil.

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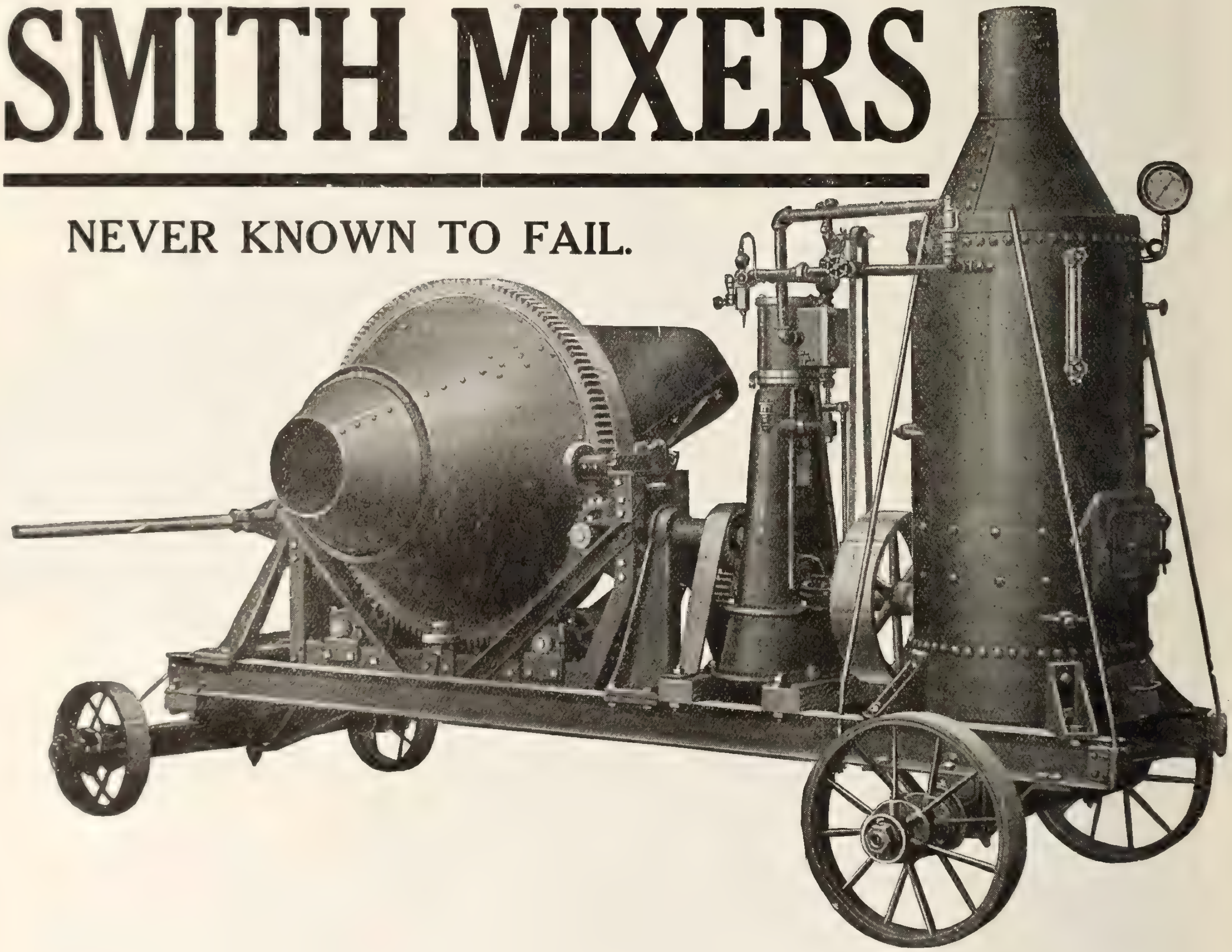

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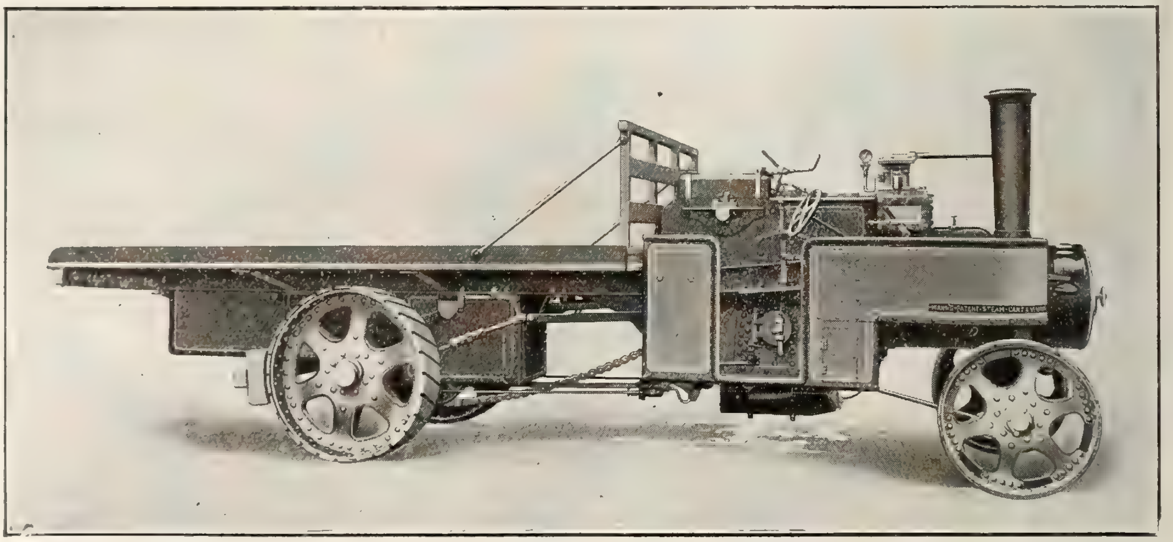

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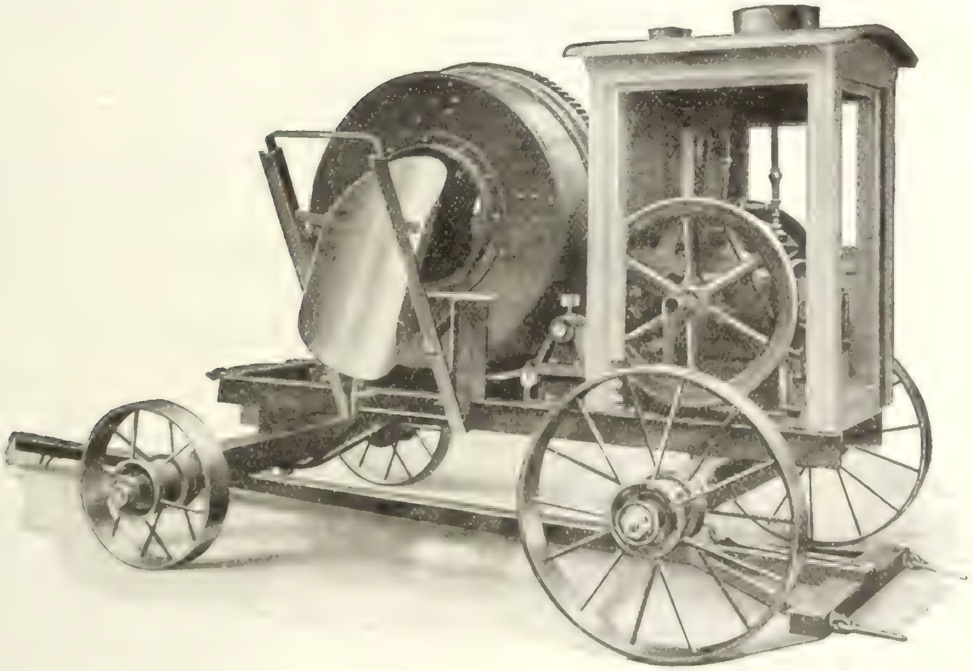

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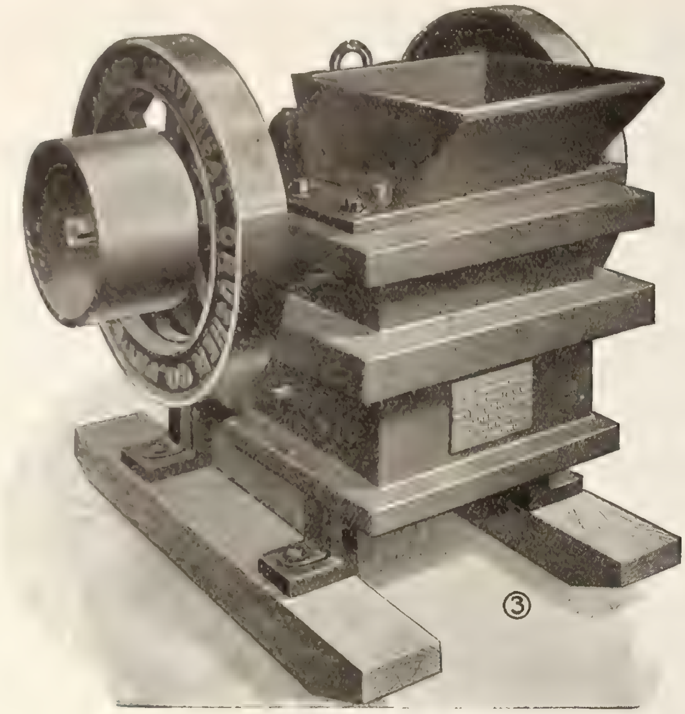

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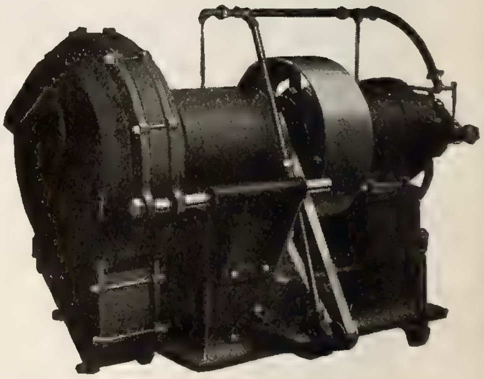

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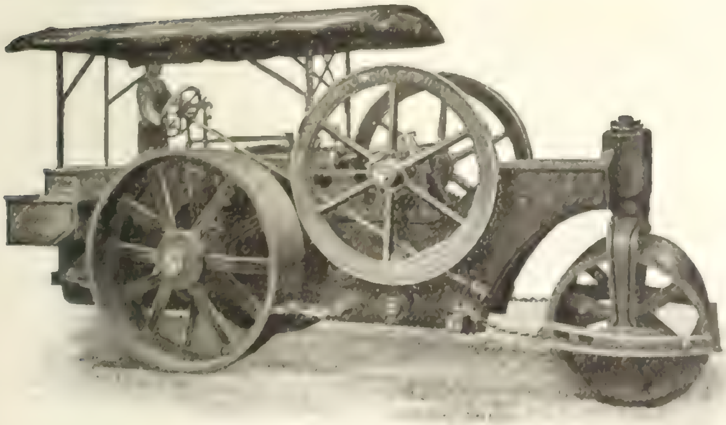

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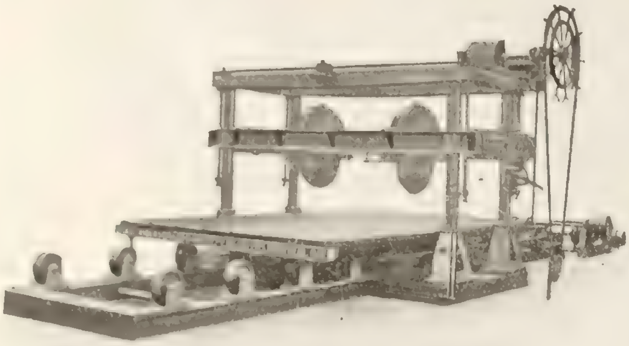

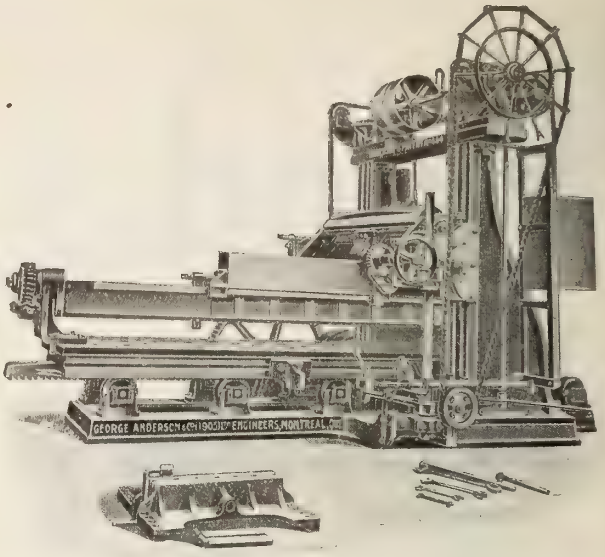
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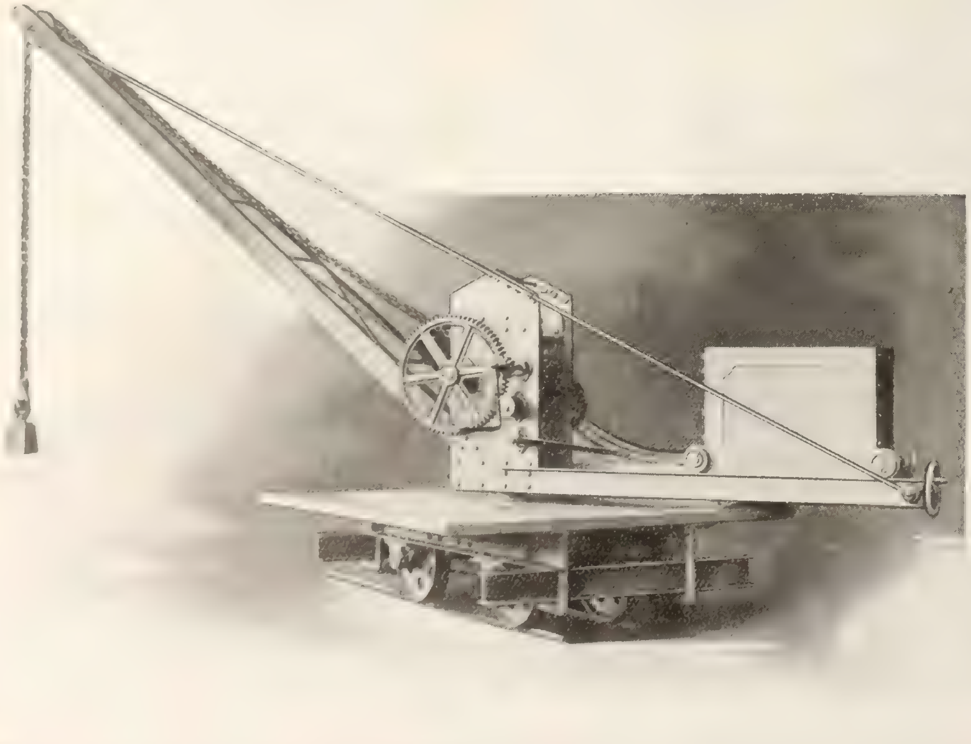

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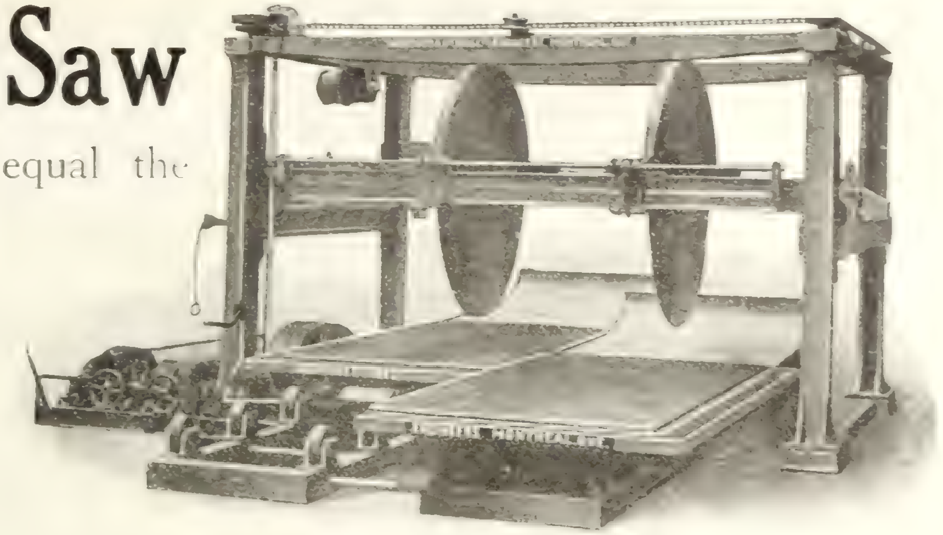

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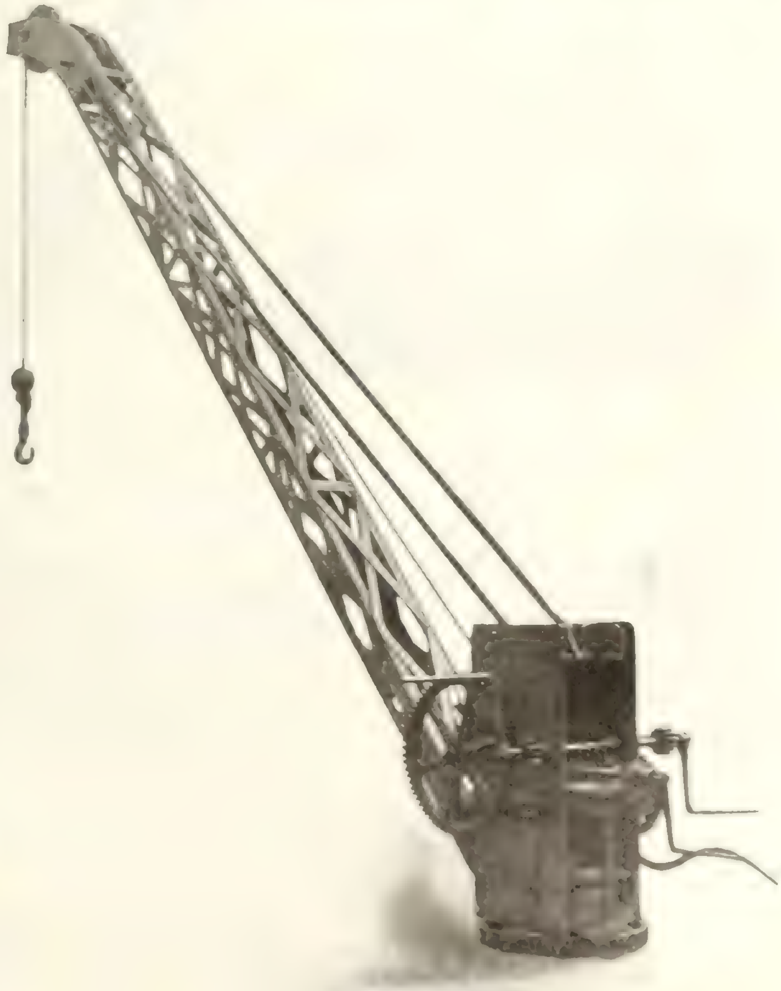

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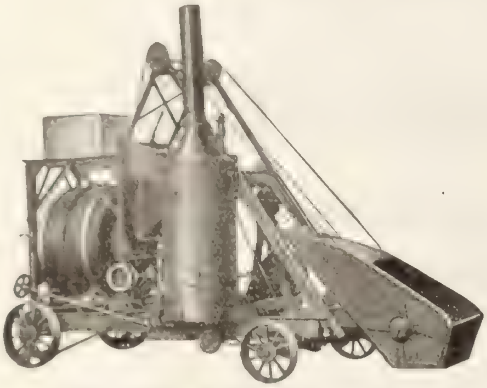

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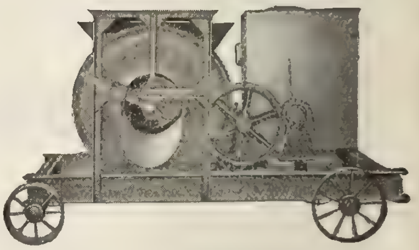
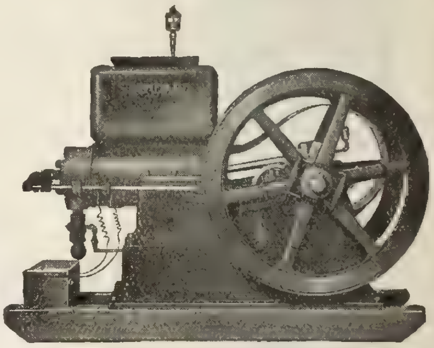


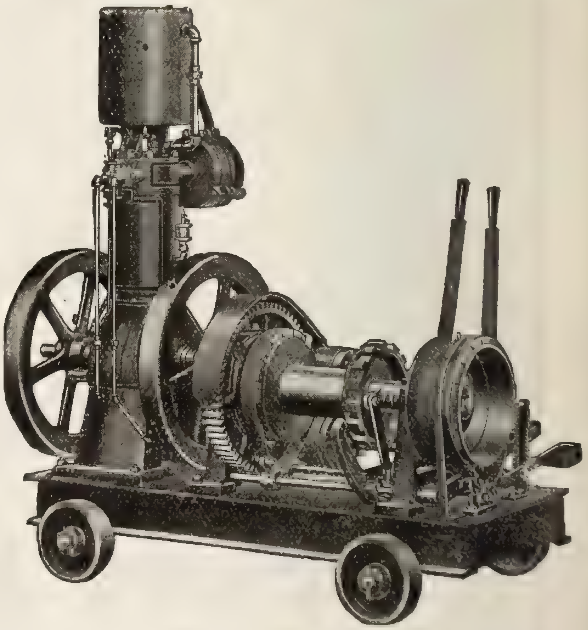
London Standard Batch Mixer with Charging Bin, Gasoline Power



Standard Gas Engine made in all sizes

London Automatic Batch Mixer No. 2

London Mortar Mixer



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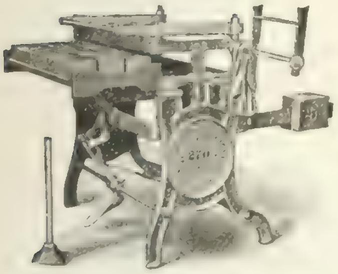

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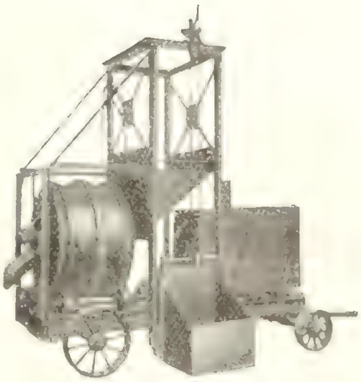
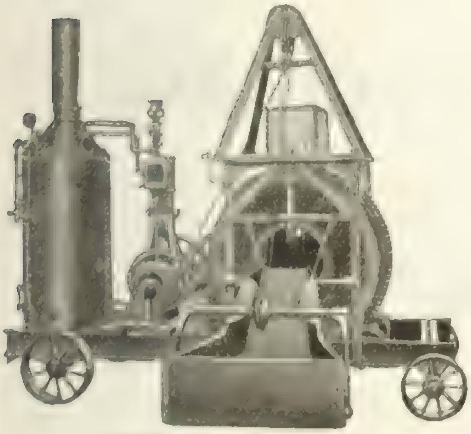


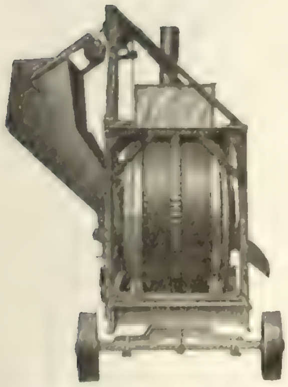
Paving Machine with side loader



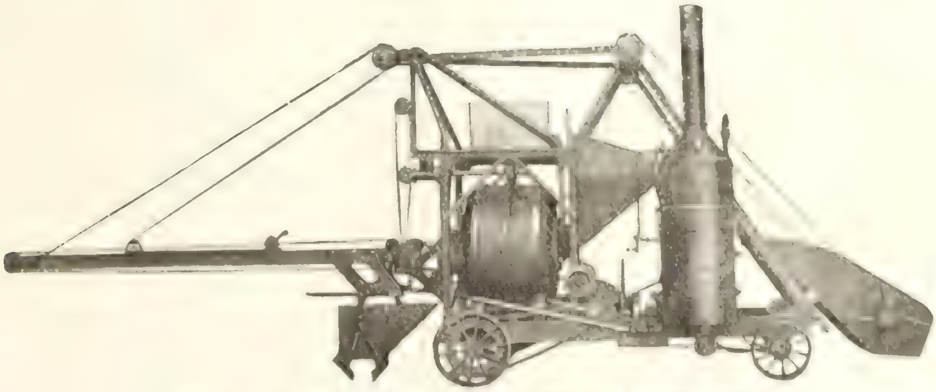
Standard Drum Batch Mixer

We are the only large Canadian Firm who specialize on Concrete Machinery.

London Automatic Batch Mixer No. 1



London Standard Drum Batch Mixer



London Street Paving Mixer with front board and delivery boom

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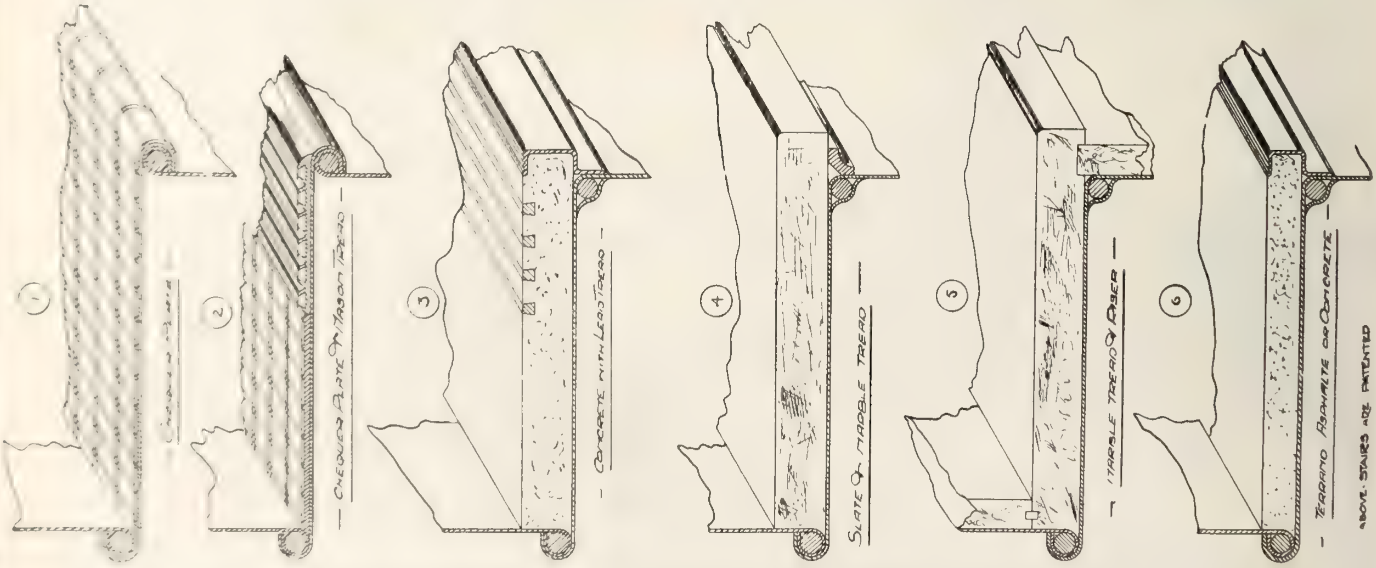
1
2
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3
CONCRETE WITH LEAD TREAD
4
SLATE & MARBLE TREAD
5
MARBLE TREAD & RISER
6
TERRAZO ASPHALTE OR CONCRETE
ABOVE STAIRS ARE PATENTED

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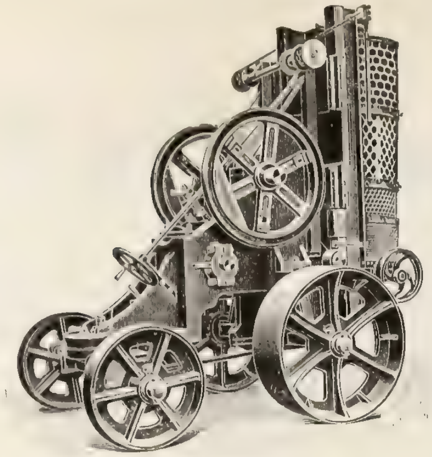


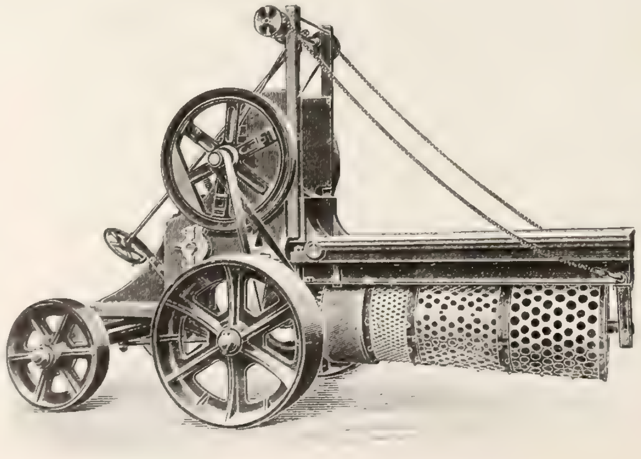
Road Making Time

is Here

How is your equipment?

If you are in the market for new machines, crushers, road rollers, tar mixers and sprayers, tar-macadam mixers, concrete mixers or **any** thing used in road making or repairing it will pay you to get our bulletins even if only for comparison.

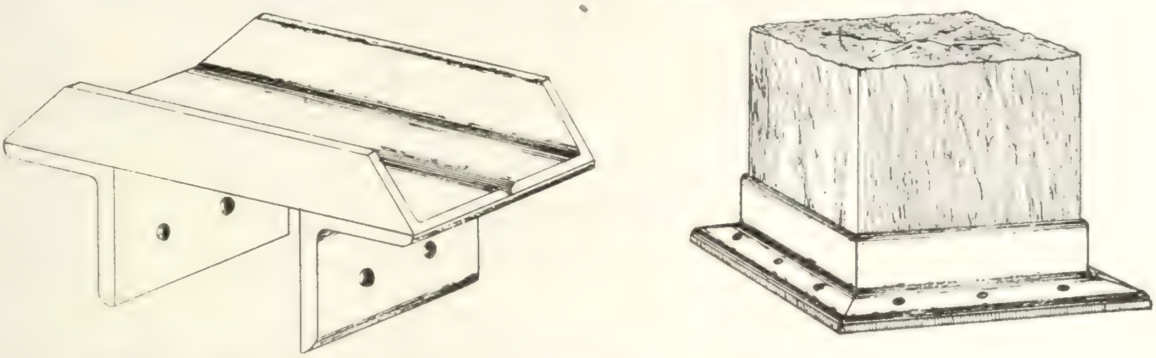
The Ford Iron Company, Limited
MONTREAL



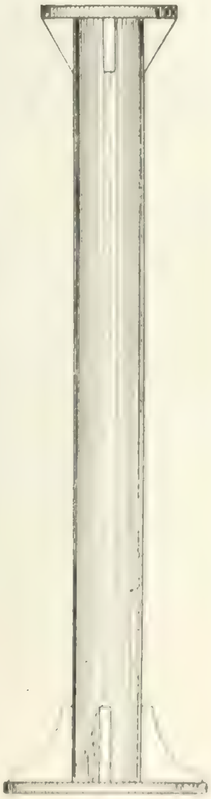
The Hamilton Bridge Works Co.

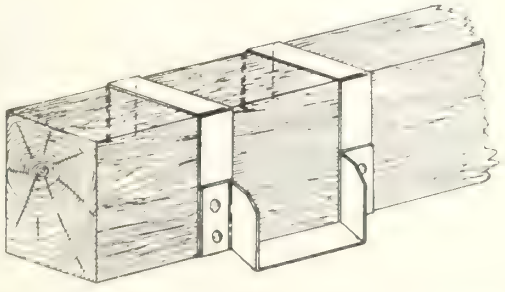
Limited

Hamilton, Canada

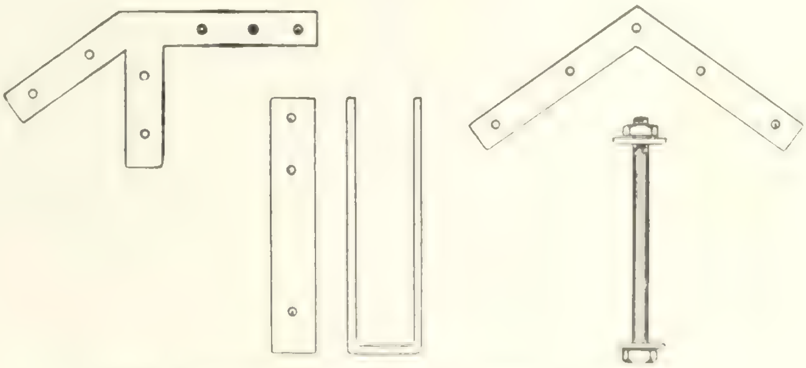


STEEL POST CAPS and Bases for Wooden Posts, any size. Also made in Cast Iron



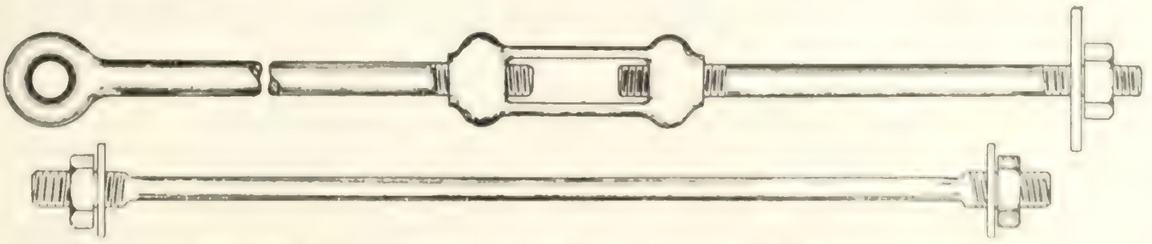


STEEL JOIST HANGERS, Single or Double



CAST IRON COLUMNS
all sizes and designs

IRON FORGINGS, for Wooden Trusses, Apex Straps,
Stirrups, Bolts and Rods made to order



EYEBOLTS, TURNBUCKLES and RODS of all Descriptions

BEAMS, ANGLES, CHANNELS, PLATES

Any size from 1½ inch to 24 inches, and any length up to 70 feet

Our Policy—like many of Our Wares—is Transparent. It is to Make the Best Glass, And We do it.

This

BRITISH + GLASS
× P.B. ×

Trade Mark

Means—

British Window Glass

The Cheapest (Quality Considered)

We Make Sheet, Polished Plate, Silvered Plate, Bevelled Plate, Patent Rolled, Rolled Cathedral, Figured Rolled, Patent Wired Rolled, Wired Cast, Polished Wired Glass, Rough Cast Plate, Doubled Rolled White Cast, Patent Prismatic Rolled Glass.

Enamelled, Mechanical, Embossed, Obscured, Coloured, Ornamental **Window Glass**

Picture, Car, Brilliant Cut, Embossed, and Glass for Photographic Purposes; Leaded Windows for Domestic and Ecclesiastic Buildings.

Pilkington Brothers, Limited

St. Helens, Lancashire, England

Canadian Offices and Depots:

Busby Lane
Montreal

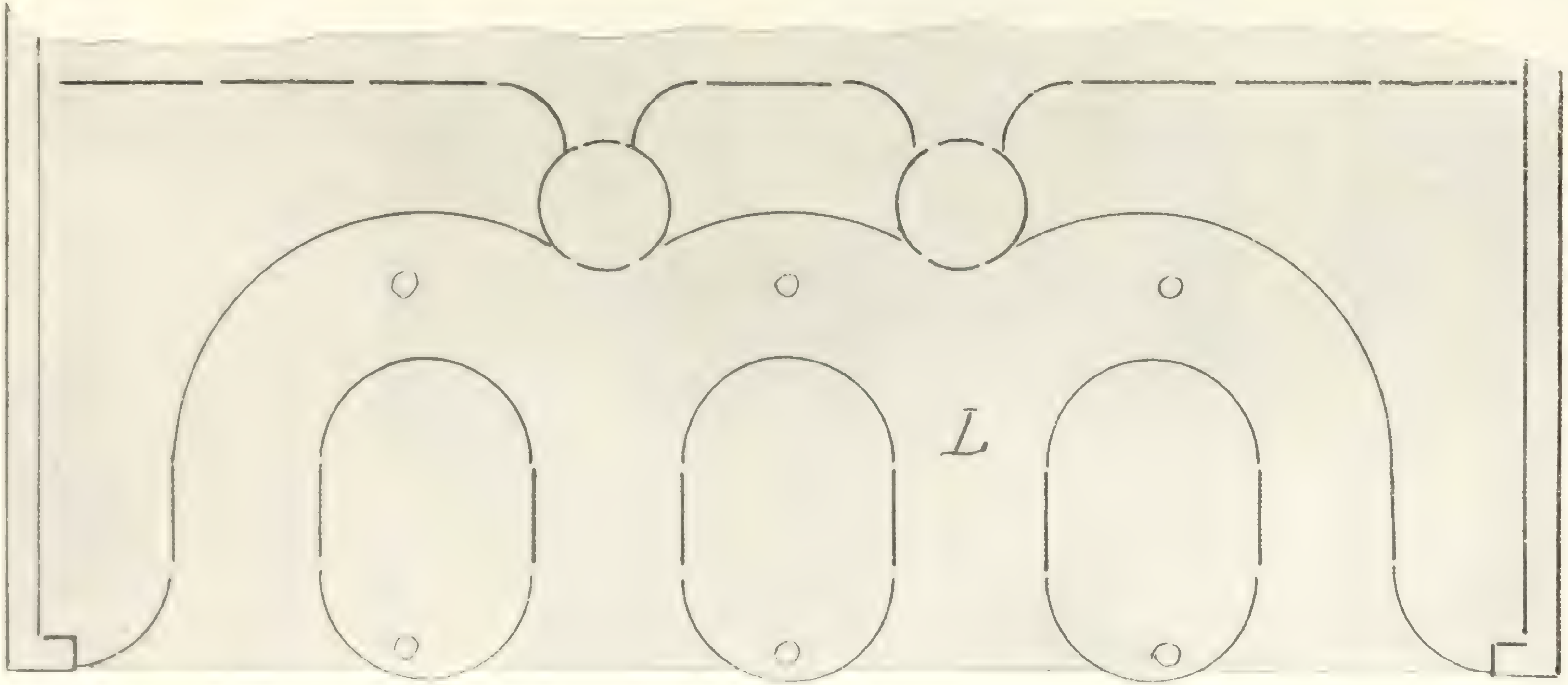
Mercer St.
Toronto

Market St.
Winnipeg

Columbia St.
Vancouver

Fine Glass Bending

"Made in Canada"



Splendid suggestion for high class store. Collonade or Corridor plan showing bent plates butted together without or with bars, revolving doors and show windows. Made on short notice.

The Toronto Plate Glass Importing Co., Limited

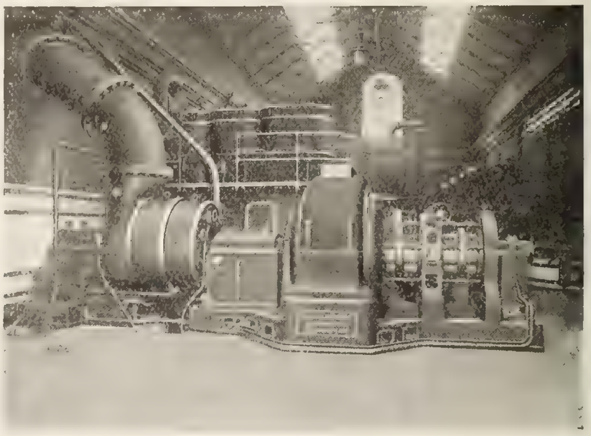
Don Roadway - - Toronto

BELLISS STEAM TURBINES

HIGH AND LOW PRESSURE

Built by

Belliss & Morcom, Birmingham, England



Reciprocator & Exhaust
Steam Turbine
installed by
Darlington Corporation

The outcome of seven or eight years careful designing and practical demonstration by a firm having thirty years successful experience in steam engineering : as a result, these turbines embrace features which render them superior to others on the market.

The city of Johannesburg (South Africa), where competition is more than usually keen, placed a repeat order for a Belliss 3000 K. W. Turbine.

Aston Manor Electricity Works placed a repeat order for a 2500 K. W. Turbine.

At present on order for Canada, Saraquay Electric & Water Co., 2000 K. W. Turbine ; City of Calgary, 2500 K. W. Turbine.

"Paterson" Filters Purifiers

Manufactured by

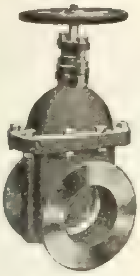
The Paterson Engineering Co., Ltd., London, England

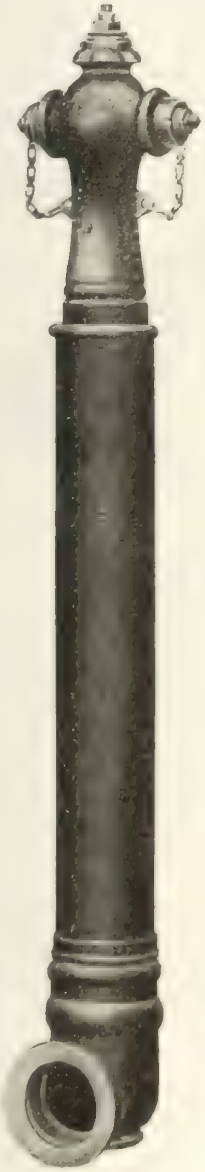
The only British firm rigidly specializing in Water Purifying Apparatus for Municipal, Domestic and Industrial Supply.

Laurie and Lamb

Canadian Agents

Board of Trade Building, Montreal





KERR
Valves
and
Hydrants

THE BEST VALVE IDEAS

You find that "Kerr" valves embody the latest and best designs in valve construction. "Kerr" are made from the best brass and iron and every part is carefully finished.

"KERR" valves and hydrants are reliable under all conditions. They give full area when open and are perfectly tight when closed.

Always specify "KERR."

THE KERR ENGINE CO. LIMITED
VALVE AND HYDRANT MANUFACTURERS
WALKERVILLE, ONT.

Why No Other Mixer Equals The Koehring for Road Work

IT combines the unequalled rapidity of the Koehring Matchless 3-in-1 principle of mixing with exclusive improvements in mechanical design that insure highest quality of product at greatest economy of production and a machine unrivaled in durability.

This superiority is shown in special types of mixers especially designed for road work, one of which is the

Koehring Hot Mixer

It forms a heating and mixing plant for the various kinds of road paving materials now on the market so constructed that there is not only greatest economy in heating and mixing but a batch is produced in least time.

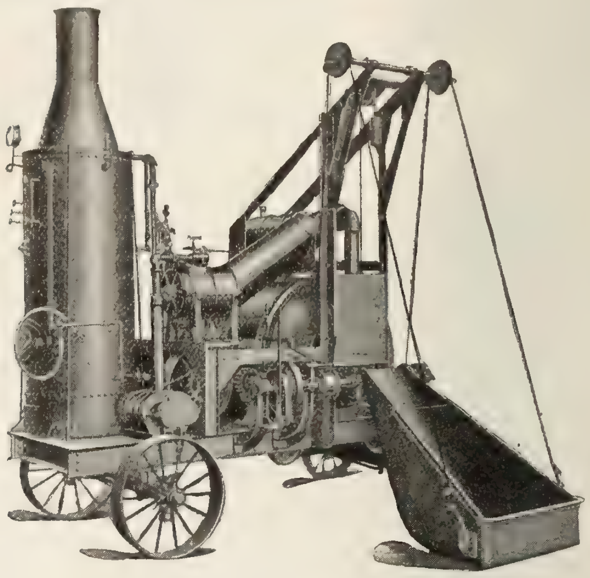
This machine consists of a Koehring standard type mixer combined with an oil furnace or combustion chamber with a lined conduit in which thorough combustion of fuel takes place before the air from the supply, furnished by a small blower reaches the drum.

The extremely hot air, therefore, blown into the drum, comes directly in contact with the material which is continually cascaded in the multiple mixing action, enabling the hot air to reach the greatest amount of material and heat the batch in shortest possible time.

With this machine is furnished the Koehring Melting Kettle mounted on trucks and supplied with an oil furnace similar to that of the Hot Mixer, suspended underneath the kettle. Air is supplied from the blower on the mixer so that one man can operate the side loader and attend pouring the asphalt oil into the drum.

Under ordinary conditions a batch of stone and sand can be heated and dried in 1½ to 2 minutes in this mixer.

Let us show you why no other machine equals this Hot Mixer for building bituminous, rock asphalt, tar macadam, or oil pavements.



No. 12 Koehring Hot Mixer

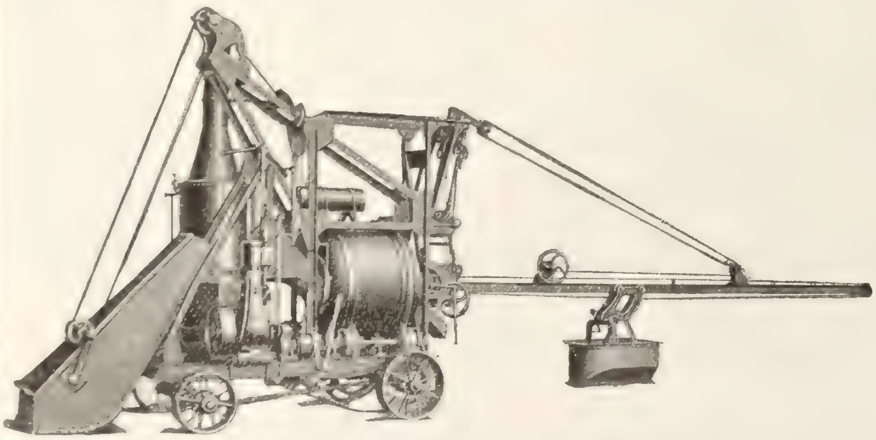
The Koehring Street Paving Mixer

is another example of the dollar-saving economy of Koehring Mixers.

It is made exceptionally compact in form with end loading bucket holding full capacity of the drum and is usually equipped with concrete delivery boom and bucket for placing the concrete without the use of wheelbarrows. It is provided with traction drive so that it can be always kept in most convenient position to produce most of the best quality of concrete with least manual labor, or it may be mounted on flanged wheels for operating on car tracks.

And the important feature is that it combines these important features of rapid and easy handling with the unequalled Koehring 3-in-1 principle of mixing insuring a quality of product at an economy of cost in laying street concrete no other equals.

If this higher efficiency in mixer design interests you, write to-day for your copy of our new 1912 catalog.



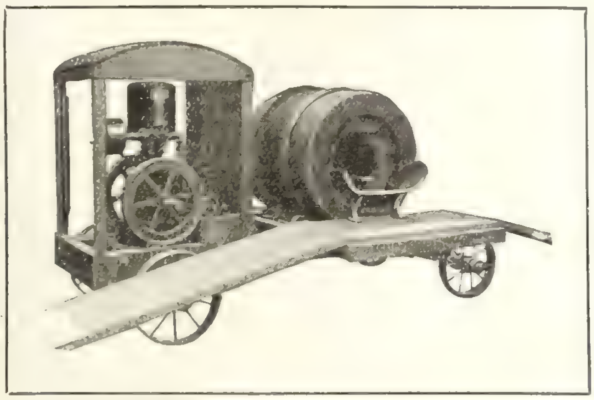
The Koehring Street Paving Mixer

Koehring Machine Co., Milwaukee, Wis.

Canada Sole Selling Agency: Canada Foundry Co., Limited

Toronto Montreal Halifax Ottawa Cobalt Winnipeg Calgary Vancouver Nelson

"The Standard" Batch Mixer



Low Charging

What are the substantial reasons for the enviable position of "The Standard" Low Charging Concrete Mixer?

What is the source of enthusiasm which every contractor and user has for "The Standard" Batch Mixer?

What qualities does it possess which compel the contractor, after having used "The Standard" to consider no other mixer

What advantage does the contractor using "The Standard" enjoy day by day which convinces him that he has the best mixer?

What causes contractors using "The Standard" to report that they would not exchange for any other mixer, no difference what the price.

What is the explanation for contractors everywhere ordering "The Standard" Low Charging Concrete Mixer, frequently exchanging or discarding other machines costing two and three times as much.

Low Charging—Simplicity—Results

"The Standard" patented Low Charging open drum, whereby the materials are charged into the mixer from a low platform about two feet from the ground, is, perhaps, the most important and highly appreciated feature.

"The Standard" simplicity is another of the principal features. Only the mixing drum, simply connected to the power for driving.

"The Standard" open drum, enabling the batch to be inspected while mixing results in high grade uniform concrete.

"The Standard" patented semi-automatic discharge is operated from either end of the drum.

"The Standard" simple equipment is built compact and light and can be moved to the best mixing location on the job in a moment's time.

"The Standard" easy of access to all parts, including interior of the mixing drum.

"The Standard" moderate size outfit, has surprisingly large mixing capacity per day. Not necessary to purchase big machines.

"The Standard" can usually be placed in cars for shipment without taking apart except removing platform, which is held by four bolts.

"The Standard" weight is not excessive and transportation charges by freight or drayage are reduced to a minimum.

"The Standard" is economical in first cost as well as economical in operating cost.

"The Standard" all regular sizes in stock at factory, warehouses and agencies ready for immediate shipment.

The Standard" special designs to meet particular requirements often afford great saving in operation.

"The Standard" built in capacities two to forty cubic feet per batch, twenty to three hundred cubic yards per day.

Advantages Which the Contractor Enjoys and Disadvantages Which He Escapes When Using "The Standard" Batch Mixer

"The Standard" is low charging. The materials are charged into the mixer from platform about two feet from the ground, avoiding building high platforms with long runways or purchasing complicated charging hoists and hopper arrangements.

"The Standard" simple construction is always ready for use, and avoids frequent break downs, so common with all complicated machinery, especially when subject to rough usage around building operations.

"The Standard" discharging arrangement simply operated from either end of the drum, saves extra man required with other machines.

"The Standard" easy running avoiding unnecessary friction, requires less power, less fuel and less attendance.

"The Standard" moderate weight machine can be easily moved from job to job, avoiding excessive freight charges or heavy hauling expense. The moderate weight machine can also be located any place on the job, often avoiding much manual labor.

"The Standard" special designs to meet peculiar requirements frequently saves heavy expenses.

The contractor using "The Standard" Batch Mixer will find he enjoys numerous other advantages and escapes many additional disadvantages.

If you wish to know more about "The Standard" write for catalogue No. 245. It will be of value to you.

Also get our catalogue on Eclipse Stone Machine. The Perfect Brick Machine. Gasoline Engines, Hoists, Trucks and Scales.

The Standard Scale and Supply Co.

1345-1347 Wabash Ave. - CHICAGO, ILL., U. S. A.

We Have the Equipment ! All We Ask is to Show You !

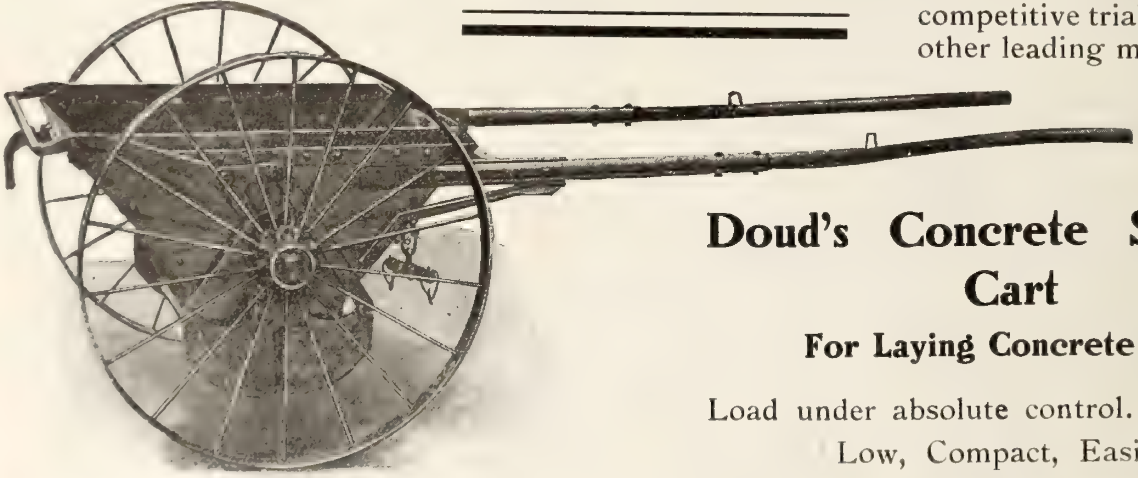
Doud's Controllable Discharge Bucket

For depositing concrete in narrow forms, where the discharge must be under positive control.

Doud's ACME Centre Dump Bucket

For the Big Work.

75 of these buckets on one job, ordered after a competitive trial with the other leading makes.



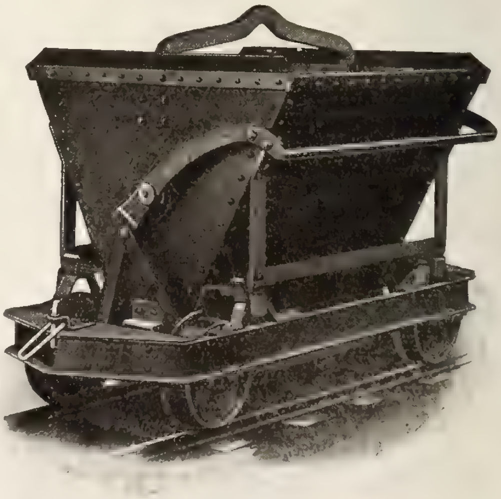
Doud's Concrete Spreader Cart

For Laying Concrete Base

Load under absolute control.
Low, Compact, Easily Handled.

Doud's Combination Bucket and Car

Absolutely Controllable Discharge. Just the outfit for retaining wall construction, concrete sewers, etc., where track can be laid over the forms.



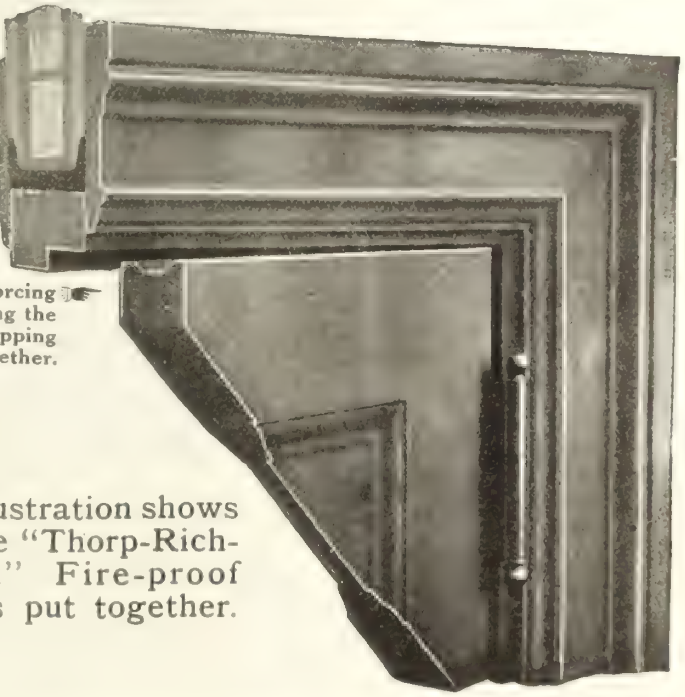
The Acme Equipment & Engineering Co.

Garfield Building, Cleveland, Ohio

Our products are now "Made in Canada." We guarantee our goods. Send for our printed matter. We furnish Buckets, of all kinds, Building Elevators, etc.

"Thorp-Richardson" Doors

"Make Each Room a Separate Building"



Note Reinforcing Band locking the two overlapping sheets together.

This illustration shows how the "Thorp-Richardson" Fire-proof Door is put together.

These seamless paneled doors, when installed throughout the building, make each room a unit of fire-proof safety.

Fully described on pages 610 and 611 "SWEETS" 1911 Edition.

We work to **Architect's details** in **Copper or Bronze. Entrances** for **All Classes of Buildings.** Working details will be submitted from sketches or elevations.

Thorp-Richardson Standard Doors are recommended by the National Board of Underwriters for **Corridor** and **Communicating Doors** for Office Buildings, Theatres and Buildings of like nature; also built for stairways and elevator shafts.

Representative in Principal Cities of United States and Canada

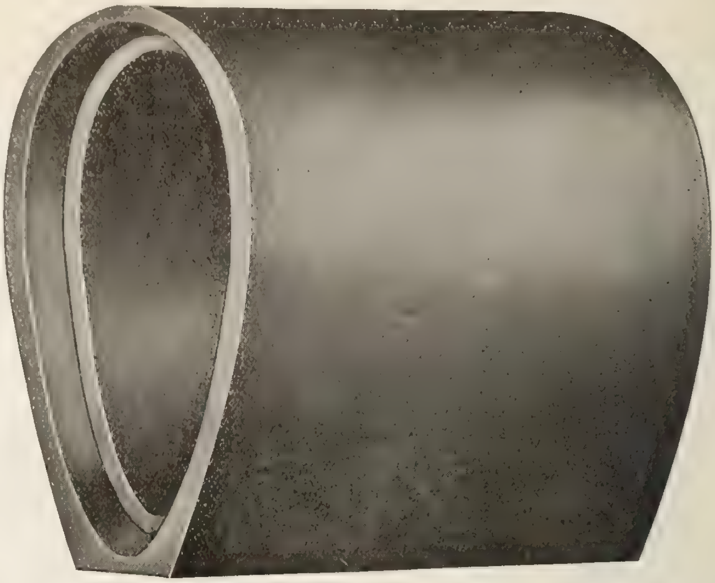
Thorp Fire Proof Door Company

Minneapolis, Minn.

Reinforced Concrete Pipe

enjoys the unique distinction of being the **only** material for **Culverts** and **Sewers** that **does not deteriorate:**

Progressive Engineers no longer hesitate to recommend its use in order to secure the **utmost permanency.**



Modern **Sewers** of European, American and Canadian cities are being built of CONCRETE. The only question is where to get the **best quality** of this material for the **least money.**

All up-to-date **Railways** use **Concrete Pipe** for **Culverts** because it is the only pipe that is proof against **rust, rot** and **frost.**

We are **expert** pipe-makers.

We adopt the best **methods.**

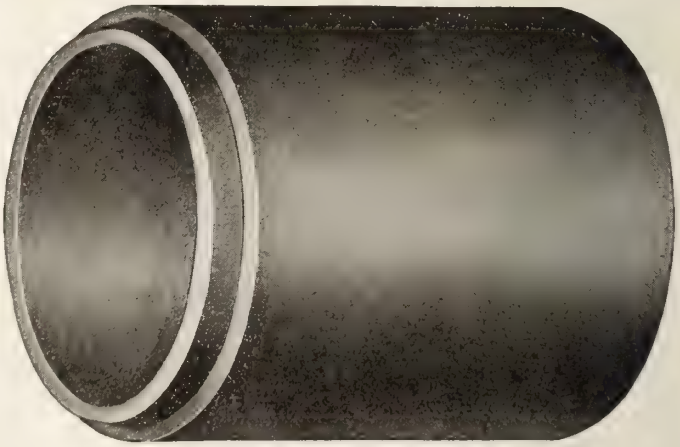
We use the best **raw material.**

We can put in any **reinforcement** an engineer specifies.

We produce the **best article** on the market, and sell it at the **lowest price.**

We carry a stock of mature goods and we can make prompt shipment.

We protect our customers against loss by breakage in transit.



Dominion Concrete Company

Limited

Kemptville - Ontario

TIFFIN

Vehicles are up-to-date, surpassed by none, built to stand wear. No false, foolish statements made in advertisements, but we stand by every claim made for them.

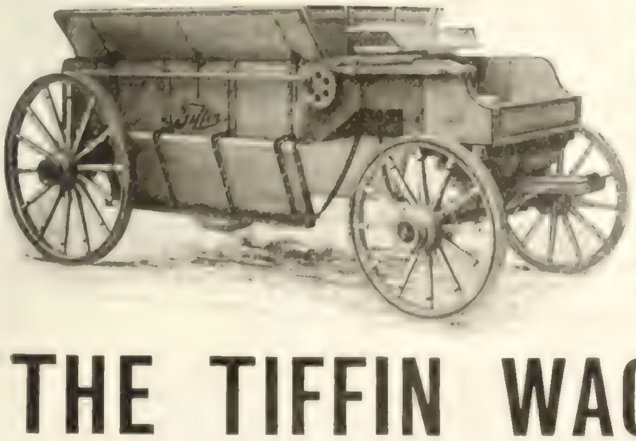
FLUSHERS

are the solution of street cleaning problems and coming rapidly into use. No more filth or dust. Minimum of expense in operation. They have put sweeping machines out of business for all time. The Tiffin machines are superbly built, free from complications and a perfect machine.

TIFFIN SPRINKLER STEEL
TANK [illegible] SPRAYERS

SPRINKLERS

Perpendicular and horizontal sprayers. Steel and wood tanks. Splendid construction. In condition for use all the time without weekly visits to repair shops.



DUMP WAGONS

It is useless to even discuss the merits of the dump wagons built by us. If you want service, simple device, thorough in operation, the Tiffin stands absolutely in a class by itself thus far.

THE TIFFIN WAGON CO., Tiffin, Ohio

Garlock Packings

Give the Service

and Service determines worth, not the price paid

TRADE THE GARLOCK PACKING CO. TRADE GARLOCK MARK HAMILTON. CANADA. MARK

This Brand stands for **Quality obtained** only after years of experience in manufacturing Engine-Room Specialties.

The same **high standard** that applies to Garlock Packings also applies to other Garlock products—all of our lines of manufacture are built **up to a standard not down to a price.**

This has been our aim for over a quarter of a century with the result that all Garlock goods enjoy an enviable reputation and for this reason do not fail to get our prices on your next requisition for supplies.

Some of our Specialties

Garlock High and Low Pressure Spiral and Ring Packing, High and Low Pressure Diagonal Packing, Asbesto-Metallic, Steam Hammer Rings, Garlock Combination Air Compressor Packing, Air-Pump Packing, Braided Metal Packing, Rubber Pump Valves and all styles of Hydraulic Packings put up in sets or coil form.

Garlock Rubber Hose for steam, water, fire and suction purposes.

Garlock Rubber Belting, Leather Belting, Cotton-Stitched Belting and Balata.

We also manufacture and carry in stock a large Supply of Mineral Wool Pipe Covering—on which we can quote you attractive prices.

WRITE FOR CATALOGUE

The Garlock Packing Company

Head Office and Factory: **Hamilton, Ontario**

BRANCHES: MONTREAL TORONTO WINNIPEG

"Pioneers in the Packing Business"

The

B. Greening Wire Co.

Limited

Works and Head Office

MANUFACTURERS OF

Wire Rope Wire Cloth Perforated Steel, Brass,
Copper and Zinc Steel Wire Chain
Trussed Steel Wire Lathing Steel Wire Reinforcing
Wire Window Guards

CORRESPONDENCE SOLICITED

Catalogue and Samples on application

The B. Greening Wire Co.
Limited
Hamilton, Ont. Montreal, Que.

MANNESMANN
STEEL PIPES

for Gas and Water Mains

also

Lead Wool

for Jointing

SEAMLESS
and
LAPWELDED

IN LENGTHS
UP TO
40 FEET

Laying Mannesmann Pipes supplied Chinook Coal Co., Ltd., Lethbridge, Alta.

WRITE FOR BOOKLETS

MUNDERLOH & CO., Limited

MONTREAL

Between the Tracks

it pays to pave with our asphalt block. BECAUSE it's durable, sanitary, noiseless, non-slippery, cheapest in the long run and EASY TO TAKE UP.

The block can be removed for track repairs and the same block laid again with the minimum of time and effort.

No ruts—no melting in hot weather.

Ontario Asphalt Block

With our block a smoothly-curved neat-looking roadway can be permanently obtained.

Champs de Mars Street, Montreal

Ontario Asphalt Block Company

Windsor, Ontario

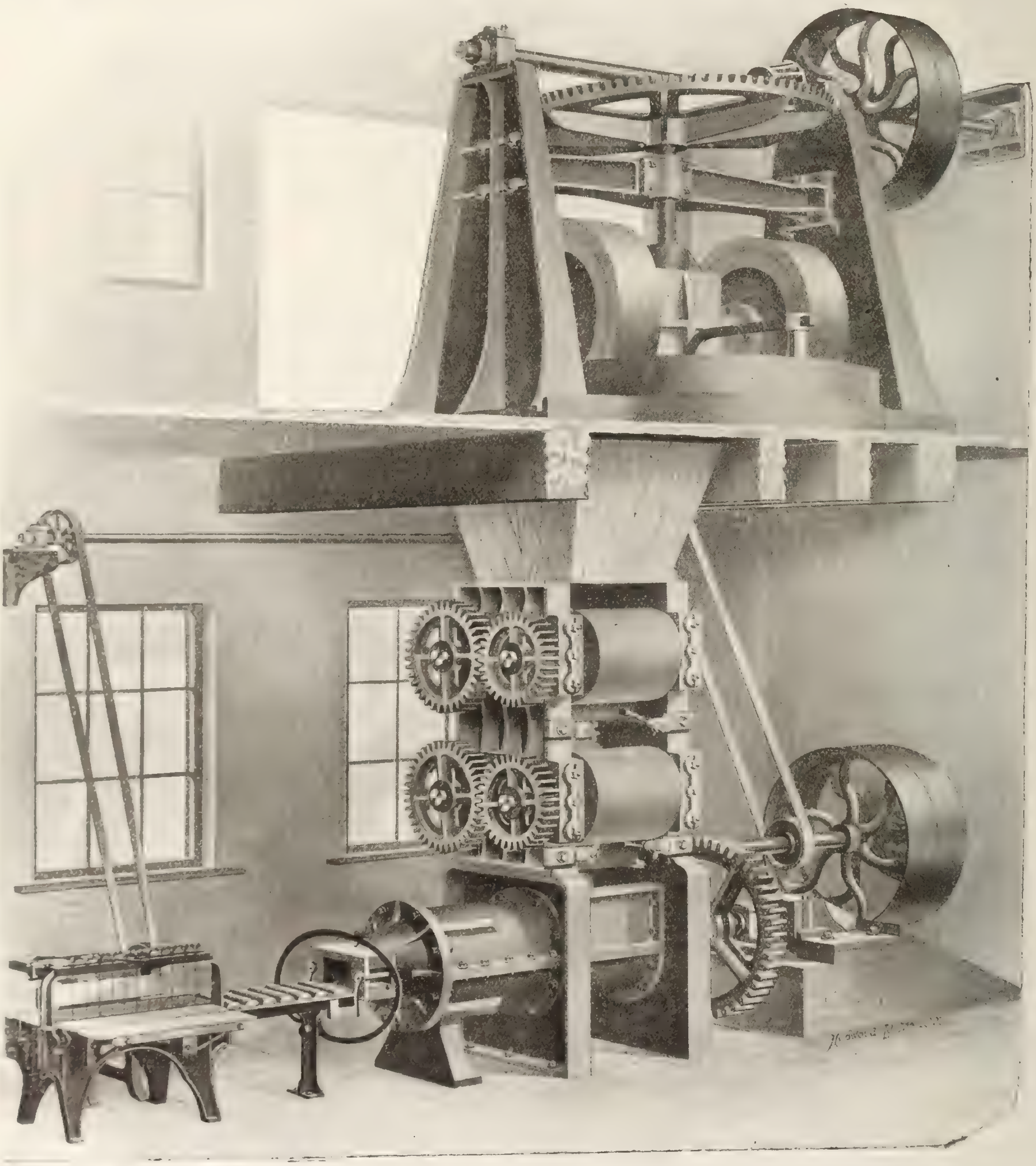
Works at Walkerville

John Whitehead & Co.
Albert Works : PRESTON, ENGLAND LIIMTED

Makers of Reliable and Efficient Brick Machinery, Tile and Pipe Machinery and Clay Working Plant for all classes of Clays and Shales.

Inquiries Solicited **Catalogues Mailed Free**

REPRESENTATIVES IN CANADA: MESSRS. CHAMBERS & SIMPSON, TORONTO



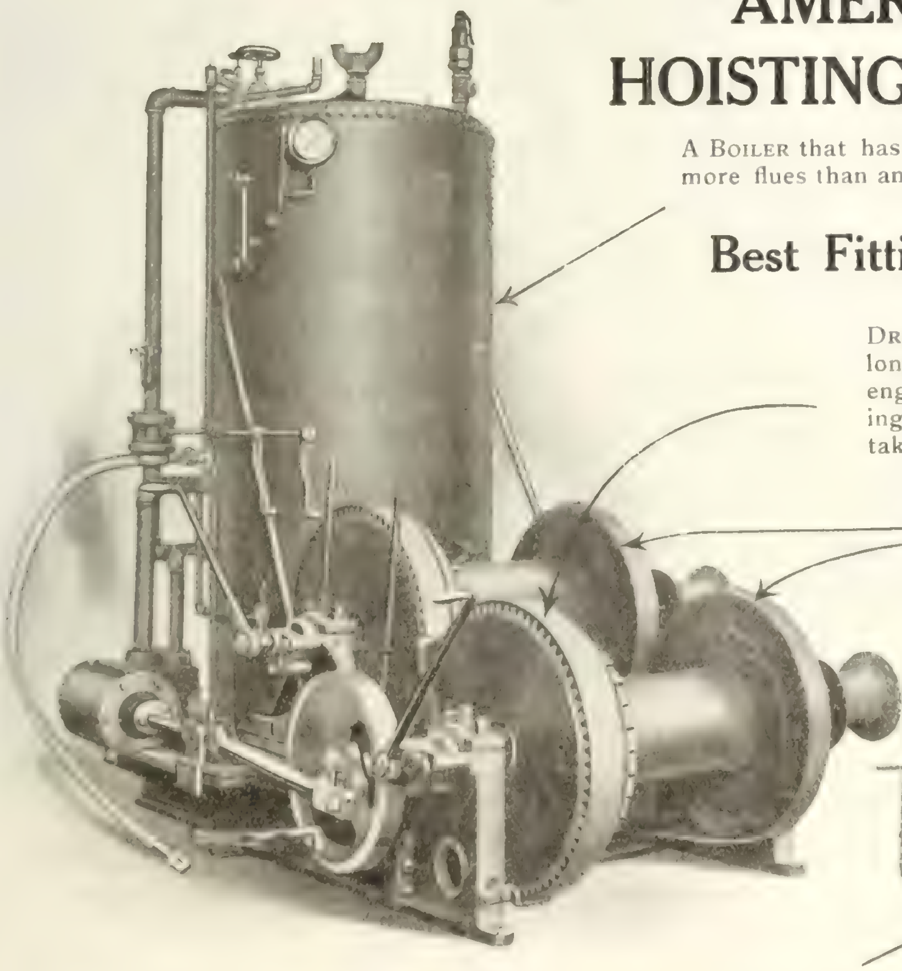
Combination Brickmaking Plant. Self-Delivery Edge Runner Mill and Brickmaking Machine

This Plant is of MOST MODERN DESIGN. It is highly recommended for dealing with rough clays or clay taken direct from the face. The Edge-runner Mill gives the preliminary preparation to the clay, and feeds it direct to the Brick-making Machine. The latter completes the processes of crushing, pugging, and moulding into bricks, and the Power Pushing Motion and Side Delivery Table cuts off the bricks to the size required.

A Few
Of the Good Things You Get
Only

When You Buy An

"AMERICAN" HOISTING ENGINE

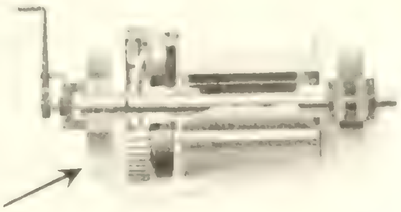


A BOILER that has 20 per cent. to 30 per cent. more flues than any other Hoisting Engine.

Best Fittings on Earth

DRUM BEARINGS larger and longer than on any similar engine. Special Bronze Bushings pressed into the drums to take up wear.

BRAKE BANDS ON ends of drums opposite to friction. This separates the brake and the friction surfaces and avoids heating.



MATERIAL. The markets of the world are earched for the best materials and for men who know how to use them.

A FRICTION that can't slip or break. It will outwear THREE of any other style friction that has ever been made.

American Hoist & Derrick Co.

St. Paul, Minn., U. S. A.

CANADIAN BRANCHES: Gorman, Clancey & Grindley, Edmonton and Calgary, Alta. and Nelson, B.C. Vancouver Machinery Depot, Ltd., Vancouver, B.C. Stuart Machinery Co., Winnipeg, Man.

BROWNING

These BROWNING Locomotive Cranes are digging and loading sand for shipment, dispersing with needless hand labor, and are effecting a saving in time which means more PROFIT.

BROWNING CRANES are designed to operate Clam Shell, Orange Peel or Drag Scraper Buckets; Steam Shovels; Pile Drivers or Lifting Magnets.

We would like to show YOU. Please write.

THE BROWNING ENGINEERING CO.

CLEVELAND, OHIO

We will be pleased to send you one of our 1912 catalogs illustrating many profitable investments.

The Canadian Norcross Bros. Co.

Contractors

GENERAL BUILDING CONSTRUCTION

HEAD OFFICE, BANK OF TORONTO, TORONTO, ONTARIO

Carrere & Hastings, Architects — **The Norcross Bros. Co.**, Builders

The Marble for this Building cut at our Toronto Plant

Cut Stone Department

Granite Works—Iberville, Que. **Marble and Freestone Mill—Toronto, Ont.**

With our modern equipped plants we are prepared to furnish **Exterior** or **Interior** Stone of any kind, guaranteeing quick shipments with first-class workmanship.

Estimates of Cost on Request

Our Representative Will Call if Desired

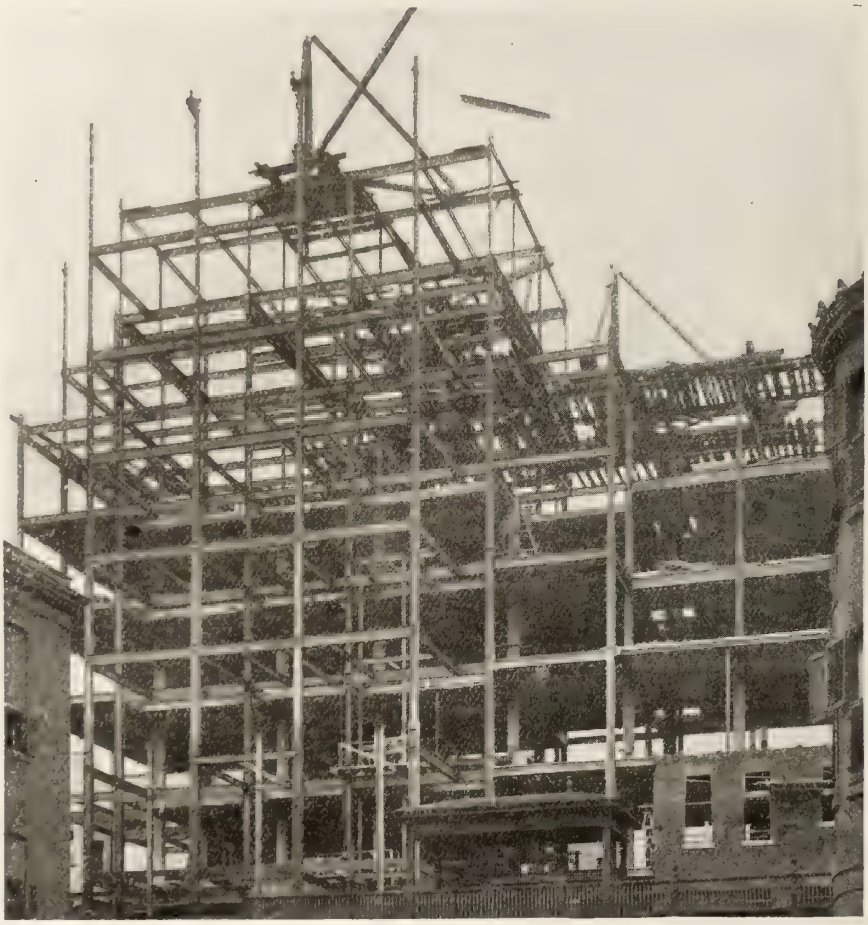
The Canadian Norcross Bros. Co.

IBERVILLE, QUE. TORONTO, ONT.

New York Boston Providence Washington Cleveland Worcester

STRUCTURAL STEEL

For Every Purpose



Montreal General Hospital Steelwork furnished and erected by Structural Steel Co., Limited

Estimates furnished promptly for all class of Steel Buildings, Bridges, Penstocks, Towers, etc.

5,000 Tons Structural shapes in stock for prompt delivery.

Structural Steel Co., Limited

MONTREAL

Simplex Concrete Piling System
Permanent Foundations

Test of One Simplex Pile at Harbour Shed No. 16 for Montreal Harbour Commissioners with load of 60 Tons, showing no settlement on removal of loading.

We are completely equipped to execute contracts for foundations to any required depth.

Estimates will be furnished on application.

Our illustrated catalogue describing the systems will be furnished on request.

Simplex Concrete Piling & Construction Co.

17 St. Sacrament St., MONTREAL

When you are preparing your specifications and tender forms for your streets, boulevards or county roads be sure to make them wide enough to include

For
park roads,
boulevards,
etc.

Dolarway Pavement

For
city streets,
highways,
etc.

Finished Dolarway Pavement

What is Dolarway Pavement?

Four to six inches of Portland Cement Concrete provided with the necessary expansion joints. The surface is then treated with our adhesive Dolarway Bitumen and with coarse sand or fine gravel or screenings. This seals the concrete, prevents cracking and chipping, and produces a wearing surface which is clean, noiseless, resilient and similar in appearance to other forms of bituminous pavement. It does not bleed in hot weather, neither does it become brittle or peel in the cold. It is a well-known fact that moisture causes concrete to expand and contract 5 times as much as a change in temperature. Our seal coat keeps out this moisture, thereby preventing the cracking and chipping which would otherwise occur.

What Does It Cost?

You can figure out what the concrete will cost per square yard in your vicinity. Add to this from 35 cents to 45 cents per square yard, which represents the cost of the bitumen, sand and labor, and the small royalty charged by our Company.

Great Economy Possible

Sealing the surface of the concrete by our method makes it possible, for the first time, to construct a pavement or highway having a concrete base and a noiseless bituminated wearing surface at from 50 cents to $1.00 per square yard less than the cost of any other permanent pavement.

Low Cost of Maintenance

The Dolarway Pavement can be resurfaced when necessary at a price of from ten to twenty cents per square yard, thus making it as good as new and prolonging its life indefinitely.

Permanent, non-slippery, noiseless and dustless. Not affected by motor traffic. Ideal for the smaller cities, as no expensive machinery is required.

For Good Roads

Wherever there is gravel or stone (hard or soft), you can build Dolarway Pavement cheaper than any other permanent roadway.

J. H. McKnight Construction Co., Ltd.

CONTRACTORS AND ENGINEERS
Specializing on Municipal Improvements
152 Bay Street, Toronto

More Daylight is Needed Wherever More can be Obtained

No Prisms No Light

Luxfer Prisms & Full Daylight

Commercial reasons as well as natural inclination emphasize the desirability of admitting all the daylight it is possible to direct into any building whatsoever where human beings have to live and work.

In a factory, the basement as well as many corner rooms, attics, corridors and passages are invariably illuminated by artificial light—in how many offices does electric light or gas burn all day long? How many stores are immersed in darkness and gloom with nothing but a little diffused daylight through an obstructed store window?

These are places which by a little scientific arrangement—a little reconstruction—could be **Flooded with Daylight**.

The top drawing shows a troublesome, inconvenient unbusinesslike but common-place occurrence—that of taking the goods to the doorway of a store to show a customer. The second drawing shows **The Remedy.**

The pictures afford a forcible illustration of the difference between **Bringing the Goods to the Light and Bringing the Light to the Goods.** Which is better—judge for yourself and we will abide by your judgment

The Installation of

LUXFER PRISMS

Will increase the value of any building by bringing

Daylight in Dark Places

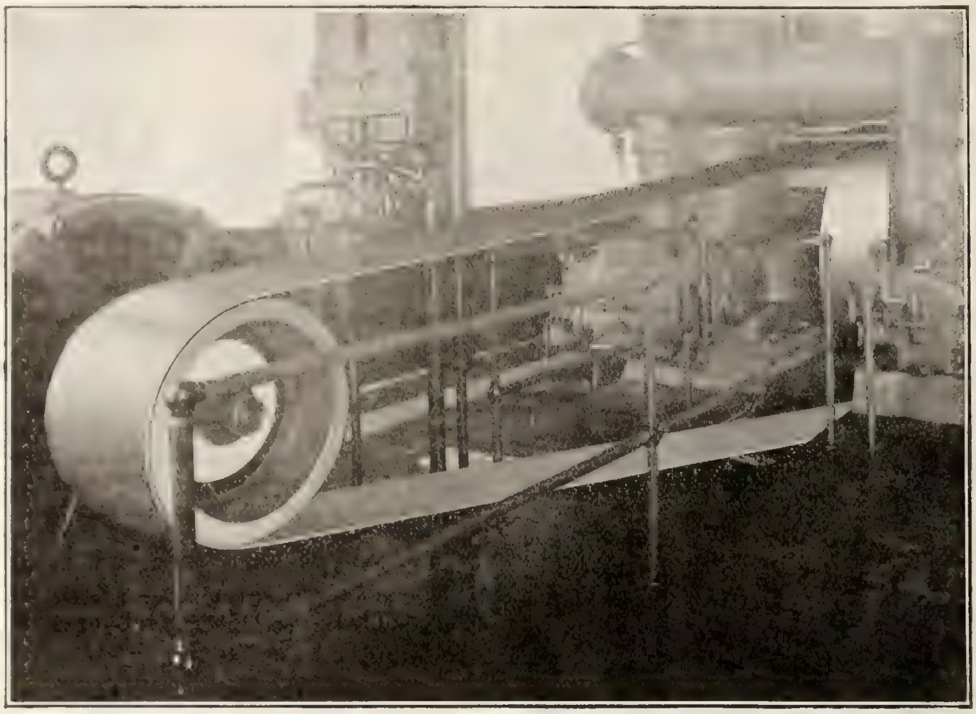
Luxfer Prisms are scientifically constructed in over fifty different angles suited to all circumstances. They are wind and weather proof and make basements as light and dry as ground floors.

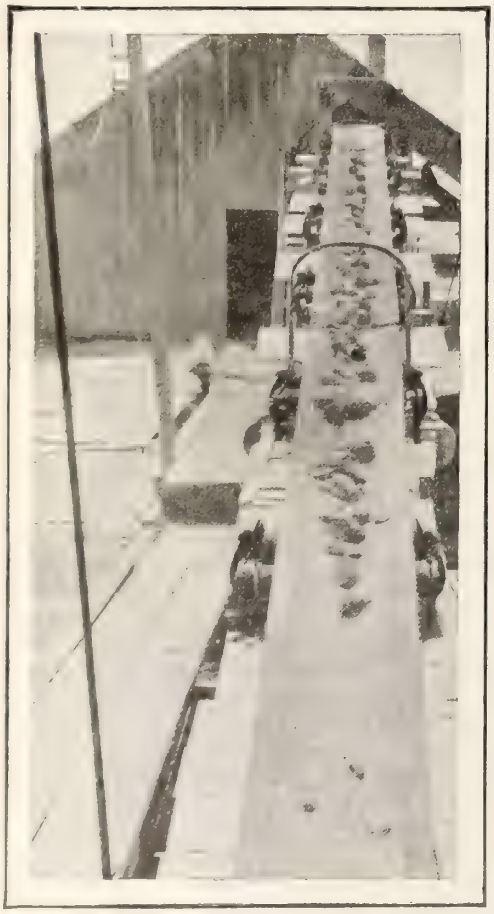
Into any dark place in any building—contemplated or existant—Luxfer Prisms will direct daylight. Give us the chance—we will prove it to you. We shall be pleased to furnish any information regarding our modern method of lighting buildings based on scientific principles

WRITE TO US TO DAY

Luxfer Prism Company Limited

100 King St. West Toronto, Ont.





Scandinavia Belting

Is a good belt for TRANSMISSION work because it is woven of best long fibre cotton, and is woven solid ; there are no plies to come apart.

After weaving it is treated with a water resisting compound, which stays soft. It is then stretched and passed between heavy rollers. By this means a belt is produced which is extremely strong and durable, and has lasting powers that are approached by probably no other belt.

Scandinavia Conveyor Belting

For conveying sharp rock and ore, we recommend our SCANDINAVIA MCM belt, but for such materials as sand, coal, wood, etc., we recommend our Scandinavia Special Conveyor belting which is much cheaper, and its wearing qualities for such service are remarkable.

We will gladly furnish more information, if you will write, giving particulars.

Federal Engineering & Supplies, Limited

TORONTO MONTREAL

Canadian Supply Co.

ROOFING CONTRACTORS

Estimates given on built-up roofs of all kinds

Arena Gardens, Toronto, roofed by us with Casco Built-Up Roofing

GENERAL CONTRACTORS: P. LYALL & SONS, LIMITED, MONTREAL

WE WILL BE PLEASED TO TENDER
ON YOUR ROOFING SPECIFICATIONS

We make a specialty of executing contracts for roofs in accordance with Barrett's Specifications.

Canadian Supply Co.

CASCO WEATHERPROOF PRODUCTS

TORONTO

High Class Interior Woodwork

It pays to deal with specialists when ordering interior fittings. Our plant is designed to turn out the highest class of woodwork for

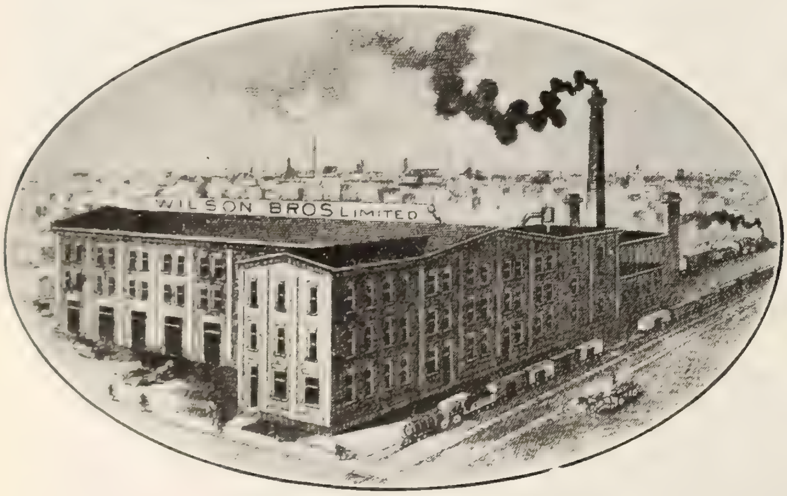
Office Buildings, Government Buildings, Banks and Libraries

We have furnished the woodwork for some of the largest bank and office buildings in Canada.

Send us your next Specifications

THE OSHAWA INTERIOR FITTINGS CO.

OSHAWA, ONT.



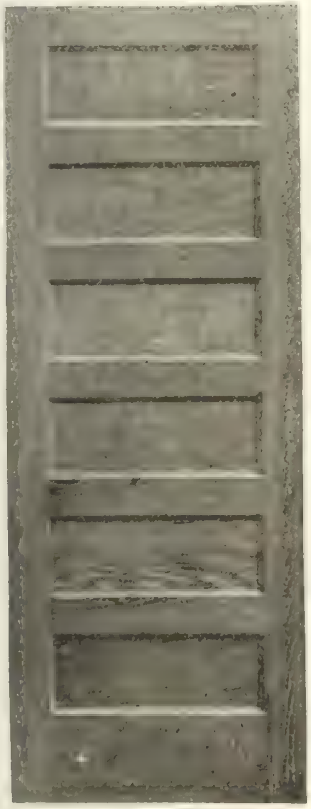
Hardwood Flooring and Interior Finish

"Wilson Bros. Limited" on flooring means a carefully kiln dried and well manufactured article. Our flooring is straightened, hollow-backed, bored, end-matched, steel polished and bundled. -:- -:- -:-

We specialize in Veneered Doors to detail.

Wilson Bros., Limited **COLLINGWOOD, ONT.**

WHOLESALE Stock Doors RETAIL



D 100

D 110

THESE are some of our Stock Designs. We carry a stock of from six to ten thousand and can ship any quantity of stock sizes, grades and styles immediately.

We call your attention specially to Door No. D 100 in No. 2 grade. It is practically clear. In many cases they run clear. Our grades all through are much above the standard.

We solicit a trial order for we are sure if you once use our doors it will mean a continuance of you handling them.

If there is any other style of Door you require, let us have your list and we will be pleased to quote you. We are in a position to get them out in short notice.

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Phone:
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Connecting to all
Departments

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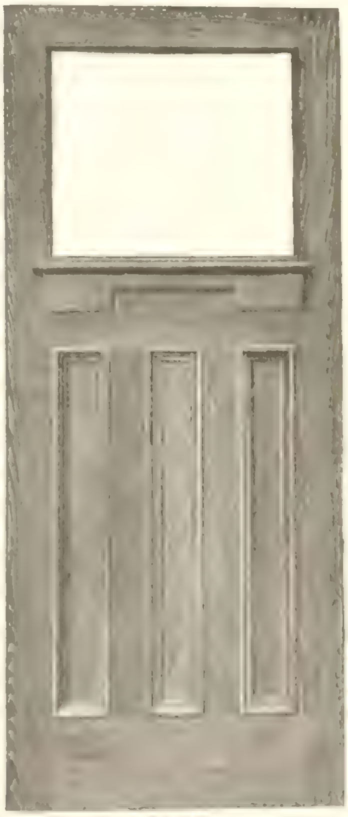
D 120



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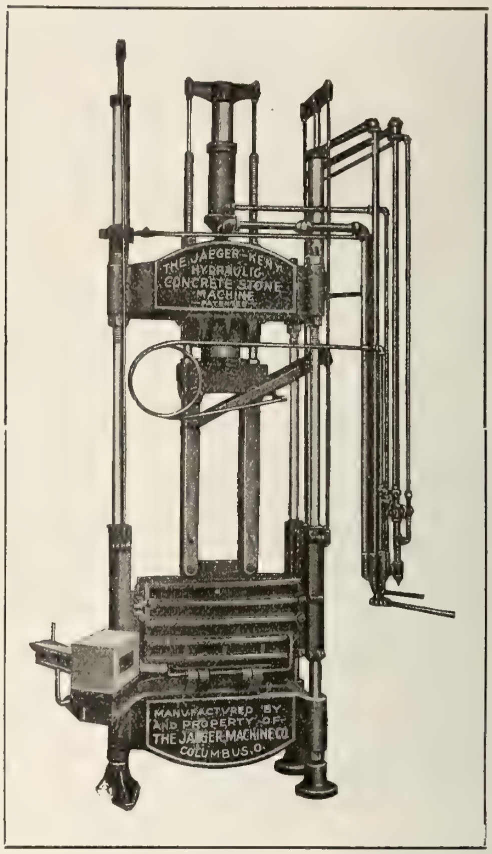
To the Large Manufacturer:—

Do you know most of the large manufacturers in the States are installing the

Jaeger Keny Hydraulic Pressure Machine?


THE JAEGER-KENY HYDRAULIC CONCRETE STONE MACHINE PATENTED
MANUFACTURED BY AND PROPERTY OF THE JAEGER MACHINE CO. COLUMBUS, O.

Because—We have shown them J-K Concrete Stone can be made at increased profits.

Because—They are made by Real Machinery.

Because—The concrete is real true concrete.

Because—The finished J-K Concrete Stone is dense, has the greatest possible strength, therefore Quality, which demands better prices.

Because—Quality is absolutely necessary and the cost of manufacture is right.

Because—The J-K Machine combines Quality and Quantity with less labor than any other machine or method.

The Season is here. You have the business—We have the machine. You need us—We need you.

Investigate.—Write for our catalog and for the address of the nearest point machine can be seen

The Jaeger Machine Company

Columbus, Ohio, U.S.A.

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Dunlop Fire Hose Catalogue

Beautifully illustrated in colors and representative of the Dunlop Line of Fire Hose and Accessories.

Gives a comprehensive description of each grade and style of hose as well as the many accessories.

Drop us a line for a copy. You'll find it worth keeping on your desk for reference. Simply ask for Catalogue F. 2.

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All Equipment Required for

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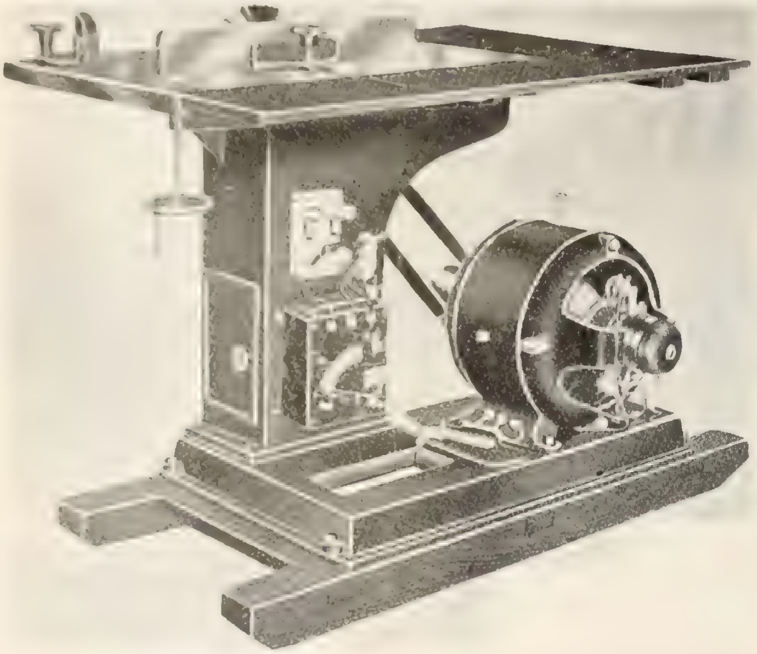
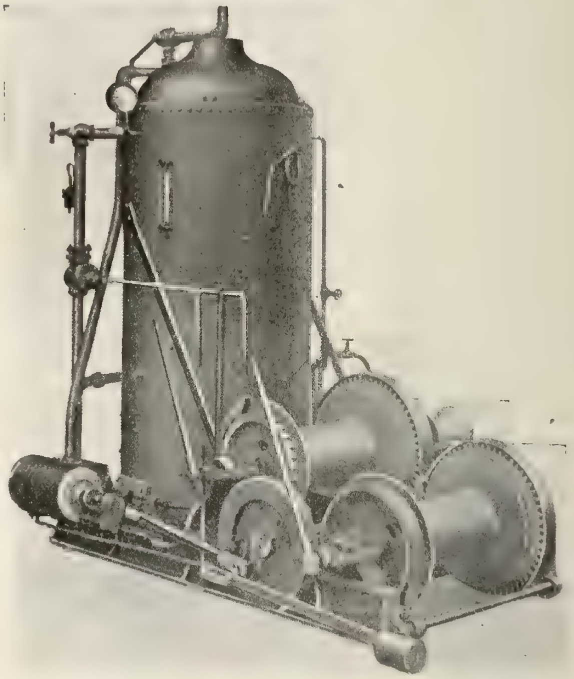
—Large Jobs or Small Jobs





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Concrete Carts—Six cubic feet capacity; cheapes and easiest means of transporting concrete.

Beatty Hoisting Engines—Double or single drums or cylinders, with or without reversible motion.

Chain Belt Concrete Mixers—All sizes in stock; steam, electric or gasoline power.

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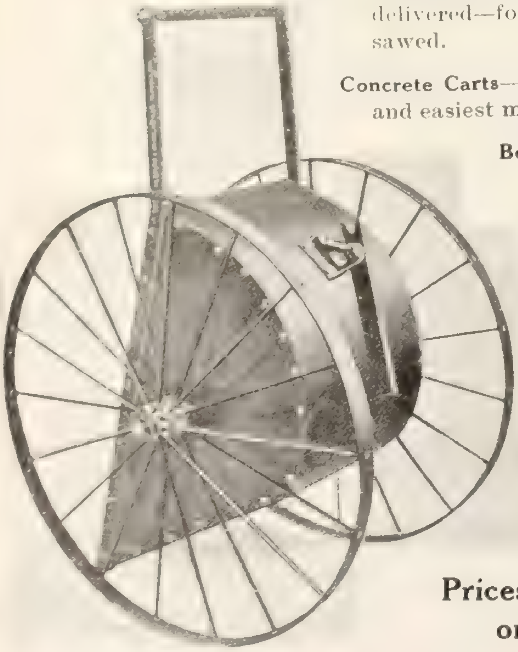

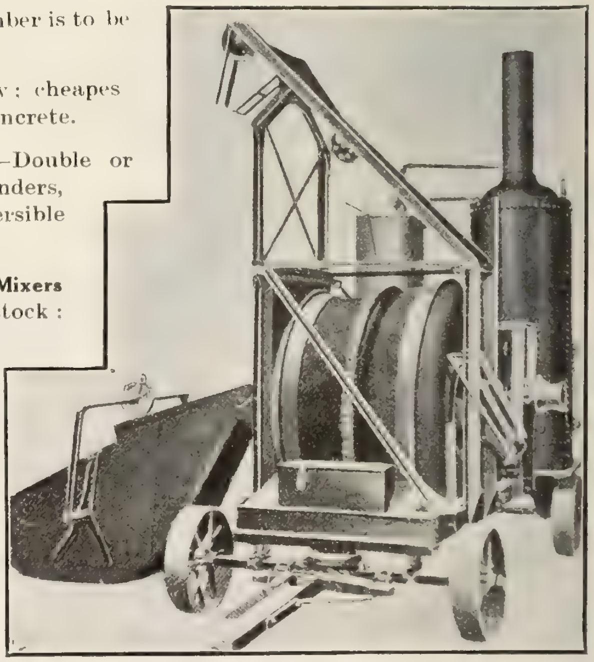

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Montreal, Que.

Factory: Turcot, Montreal **Quarries: South Stukely Que.**

Estimates and Samples cheerfully furnished on application

Telephone or write us and one of our representatives will call when in your vicinity

An entrance to Union Bank Bldg., Metcalf Street, Ottawa, in

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With a modern mill and up-to-date machinery we are equipped to handle your

Marble Work

in the best possible manner and give prompt deliveries.

Address all correspondence to the Company, **P. O. Box 1166, Montreal Que.**

Wooden Water Pipe

Galvanized Wire Wound and Continuous Stave Pipe for Water Works, Power, Irrigation, Etc.

Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquiries. Write for prices.

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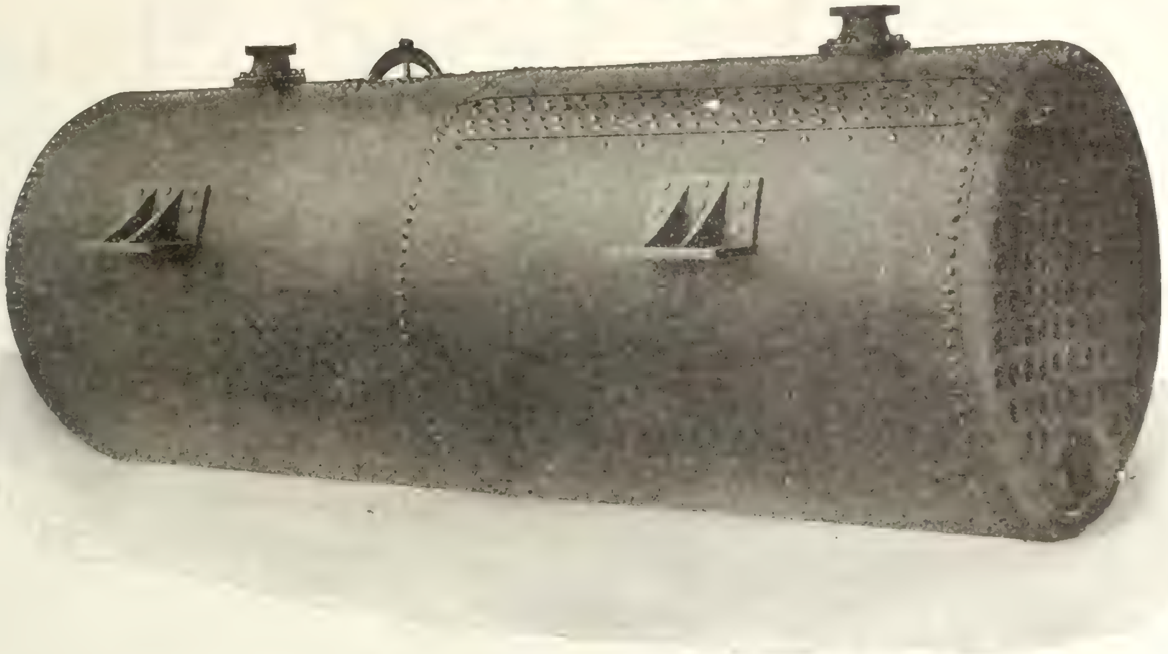

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General Offices: Sherbrooke, Que. Works: Sherbrooke, Que. - St. Catharines, Ont.

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Make a DAYLIGHT Job out of Your NIGHT Job

Get a full white light on your excavating, dredging, tunneling, grading or heavy foundation work. Don't experiment with "glimmers." You want daylight's rival

A Pyle National Special Stationary Lighting Equipment the apparatus that is giving the highest degree of service to contractors everywhere, boosting their profits by diffusing a light over the work that "chains" the men to the job.

The Pyle-National Special Stationary Lighting Equipment is the result of careful study by skilled engineers and an experience of over 15 years in the production of this perfect light.

There are over 16,000 Pyle-Nationals in use. This is proof of their superiority. If you want more write for catalog.

STATIONARY LIGHTING DEPT.

Pyle-National Electric Headlight Co.

McCormick Building Chicago, Ill.

We Make Good Stone

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Roman Stone Has Advantages Over Natural Stone

Its strength (being reinforced), its durability and its fire resisting qualities have been clearly proven. The hundreds of buildings of Roman Stone are permanent evidences of its stability and beauty.

Roman Stone makes a decorative facade possible where the cost of the same work in natural stone would be prohibitive. It is equally adaptable to Public Buildings, Churches or residences.

The Roman Stone Company
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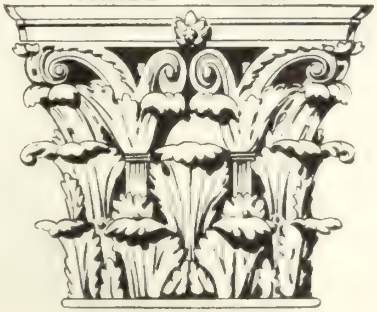
204 St. James St., MONTREAL
Sales Agent for Quebec

CORINTHIAN STONE

TRADE MARK



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Is the only manufactured stone which can be cut and dressed, to give the same appearance as NATURAL STONE.

Tovell's Block, Guelph

The Corinthian Stone Co. OFFICE AND WORKS: G. T. R. JUNCTION, GUELPH, ONT.

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The Chain Belt Way

MEANS MIXING and elevating Concrete in the shortest time, at the minimum cost per yard. This photograph shows the CHAIN BELT ELEVATOR and the CHAIN BELT MIXER at work on the Boston Store, Milwaukee. Concrete is being laid at two floors at the same time. This Elevator is of steel—self-supporting—requires no tower—has the simplest tripping device, and operates with speed and smoothness.

No More Breakdowns, No More Delays, is the slogan the users of CHAIN BELT CONCRETE MACHINERY have adopted. Ask the Contractor who owns a CHAIN BELT MIXER what he thinks of the CHAIN BELT DRIVE—the DRIVE, by the way, which we guarantee for two years. Dollars to cents he says, "No more gear-driven machines for me."

Mr. Contractor, you are wasting your time, energy and money by fooling around with a gear-driven machine. Be up to date. The CHAIN BELT DRIVE is far more practical, because it is smoother running—less friction—consumes less power—and then you don't have any gears to get clogged or wear out. As mentioned before, we guarantee this CHAIN BELT for two years. Are your gears guaranteed for this length of time? We have been selling Mixers for four years now, and haven't replaced a link of CHAIN BELT yet. We think this is a pretty good record.

Send today for information.

Chain Belt Company
MILWAUKEE

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Canada Machinery Agency

Ottawa, Ont.
The General Supply Co. of Canada

Vancouver, B.C.
Dominion Equipment & Supply Co.

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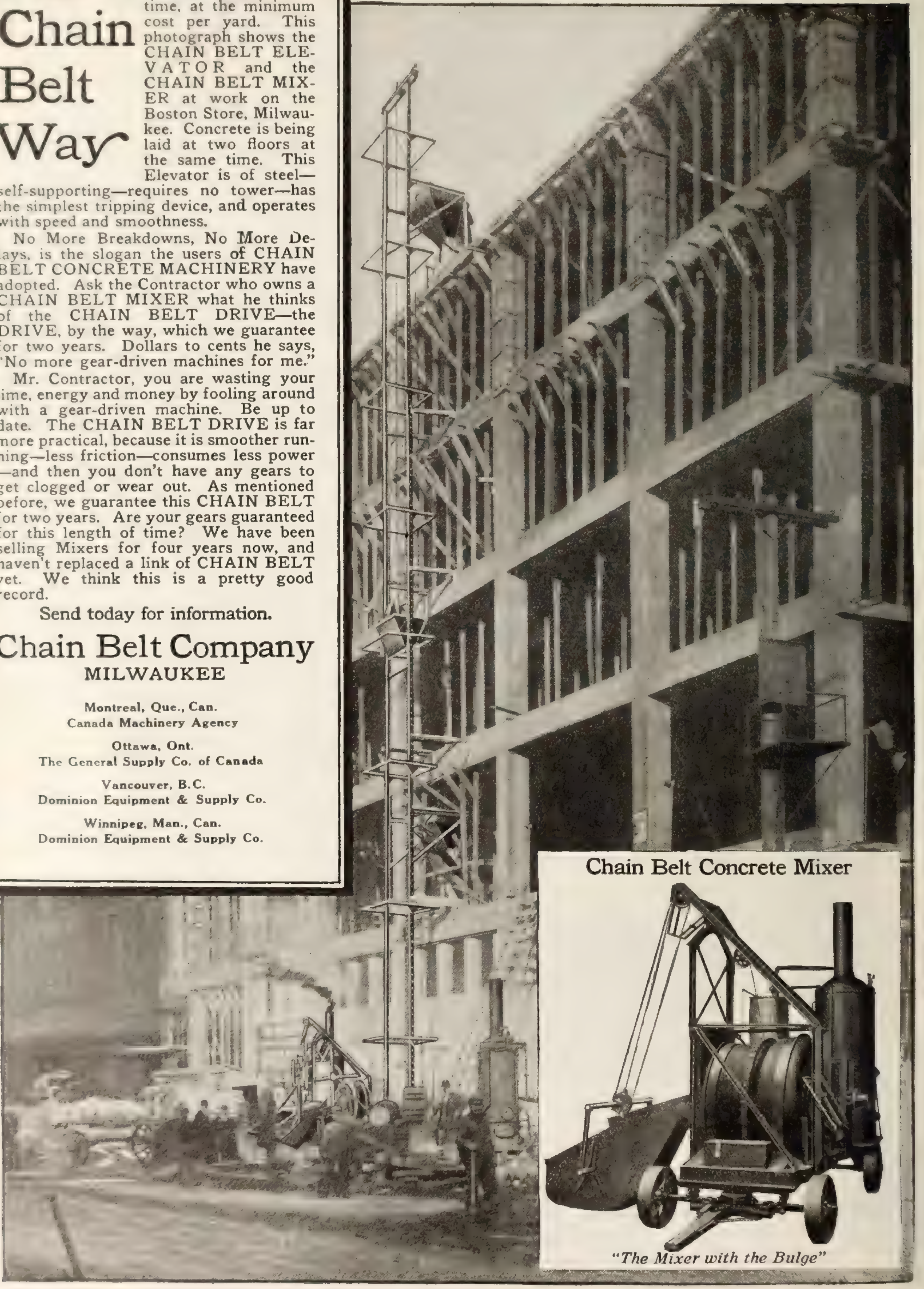
Dominion Equipment & Supply Co.



Chain Belt Concrete Mixer

"The Mixer with the Bulge"

"R. I. W." DAMP RESISTING PAINT
"TOXEMENT"
"CEMENT FILLER" and "CEMENT FLOOR PAINT"

TOCH BROTHERS
ESTABLISHED 1848

"R. I. W." NO. 232.

For application to the inner surface of exterior brick or masonry walls, above grade level. Prevents the penetration of dampness. Saves the cost of furring and lathing.

"R. I. W." No. 110.

For backing limestone, granite and other building stones. Absolutely prevents any interior acid, alkali, rust or moisture from reaching the surface of the stone.

"TOXEMENT."

A chemical compound which, when mixed to the extent of 2 per cent. of the amount of Portland Cement used, will render cement or concrete construction absolutely waterproof against pressure. Is used for water-proofing floors, foundations, elevator and boiler pits, cement mortar troweled on the outside of rubble foundations, cement stucco, etc.

"R. I. W." NO. 112.

Used on structural steel work which is to be encased in masonry, and on brine and condenser pipes. This material will not withstand exposure to the elements.

CEMENT FILLER and CEMENT FLOOR PAINT

For use on cement floors in hospitals, laboratories, engine rooms, factories, etc. Will prevent cement floors from dusting up, also renders them oil-proof and water proof.

SEND FOR LITERATURE AND INFORMATION

CANADIAN OFFICE AND FACTORY

The "R. I. W." DAMP RESISTING PAINT CO.

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CANADIAN DISTRIBUTERS

CHILLAS-BLACK, LIMITED Toronto
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THOMAS BLACK Winnipeg
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Acorn Quality Fire-Proof Windows

WE claim for this window that it is the only one on the market to-day that is absolutely **windproof** as well as **fire-proof.** This is accomplished by the flange setting into the rabbit ⅞ inch, which not only forms a perfect wind break, but does not interfere with the working of the sash.

¶ The whole window is stamped by steam power, with steel dies, so that all parts are uniform.

¶ When you want fire-proof windows, ask for Acorn Quality, and be sure you take no other. If you get Acorn Quality, you get satisfaction, and you get safety from wind and fire.

¶ Before you decide to place your order, be sure and write to us and get our prices, and let us show you what Acorn Quality Fire-proof Windows really are.

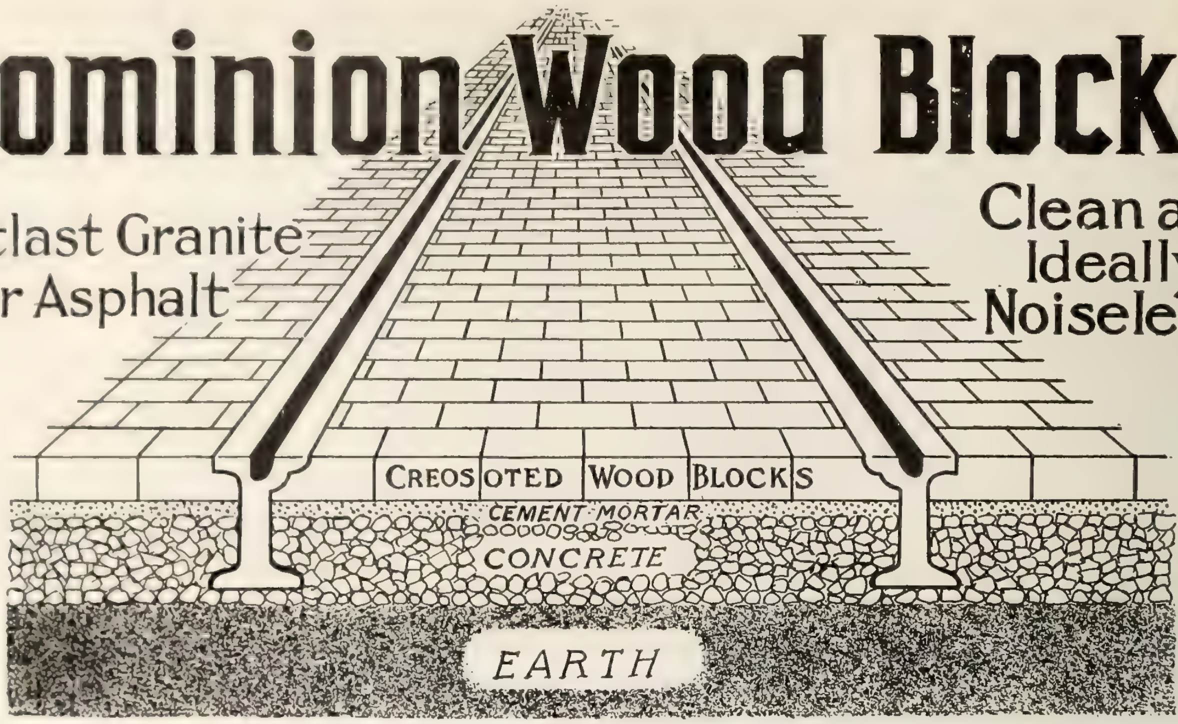
¶ We feel sure of your decision.

The Metal Shingle & Siding Co.
Limited
Preston, Ont. - Montreal, Que.

Dominion Wood Blocks

Outlast Granite or Asphalt

Clean and Ideally Noiseless



The Proof of the Pudding

May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

Permanent Pavement

One that requires the constant attention of the Repair Gang to prevent its break-up and ruin could not be said to have proven satisfactory. Yet the Repair Gang seems to be an essential feature of Patent Pavements. ¶ How often have you seen the **Creosoted Wood Blocks, The Wood Eternal,** being PROVED IN THE PUDDING MANNER? ¶ Dominion Creosoted Wood Paving Blocks are cut from the log of live Douglas Fir in our own mills.

Dominion Creosoting Company

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"Hygrade" Electrical Wires and Cables

Copper Aluminium Iron

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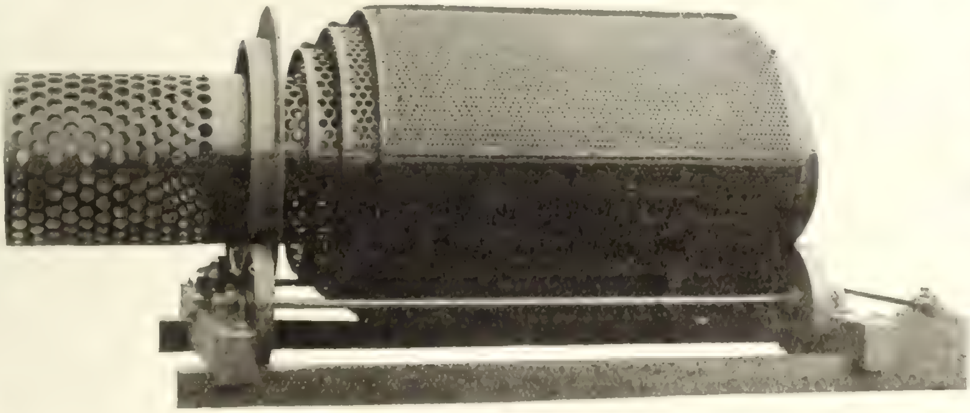
THE GREATEST STONE SCREEN BUILT

Descriptive Circulars on Request to Any Address



BUILDERS' HOISTS and MATERIAL ELEVATORS

Every up-to-date builder or contractor should post himself on the most economical way to elevate building material. We have prepared an interesting booklet on

HOISTS and ELEVATORS

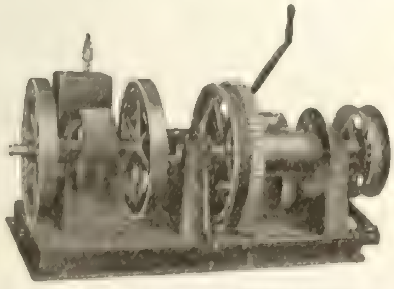
which we will send to any one interested.

Write for it

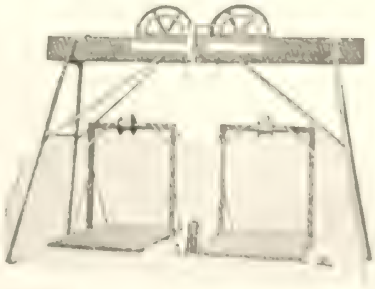
Bates & Edmonds Motor Co.

Lansing, Mich. U.S.A.

"A. R. Williams Machinery Co., Ltd., Canadian General Agents, TORONTO, ONT."

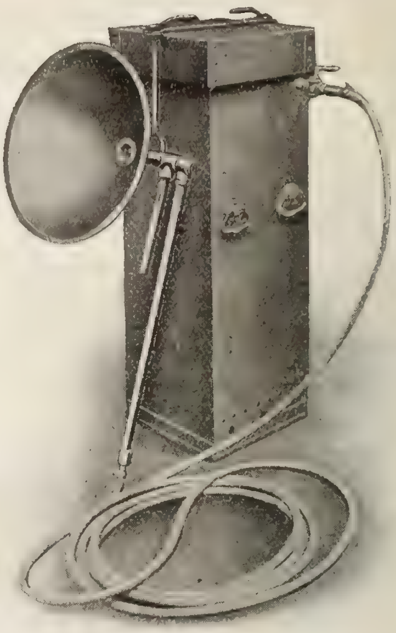


Hoist and Engine complete direct connected three sizes, 4, 6 and 8 H.P.



Double Platform Elevator for any elevation

The Dark Has No Terrors For the Contractor With A Milburn Light



The Rays Are Thrown Directly On The Work

The Milburn Light is an improved gas light, generated from acetylene. It resembles sunlight closely and is more penetrating and diffusive than any existing light.

There is nothing about it to fail or get out of order, and it requires no technical knowledge for its use. The light follows the crane or the shovel and throws its rays directly upon the work.

The Milburn Light is absolutely safe, lights instantly, requires no attention during its use and positively defies wind and weather.

It has proved most effective for underground work. For wrecking cars, steam shovels, dredges, etc., it is unsurpassed.

A 1000 candle power Milburn Light costs only 1¼ cents per hour. There is no upkeep expense.

Write today for catalog No. 15 of Contractors' Supplies

The Canadian Fairbanks-Morse Co., Limited

Fairbanks-Morse Gas Engines, Fairbanks Scales, Safes and Vaults

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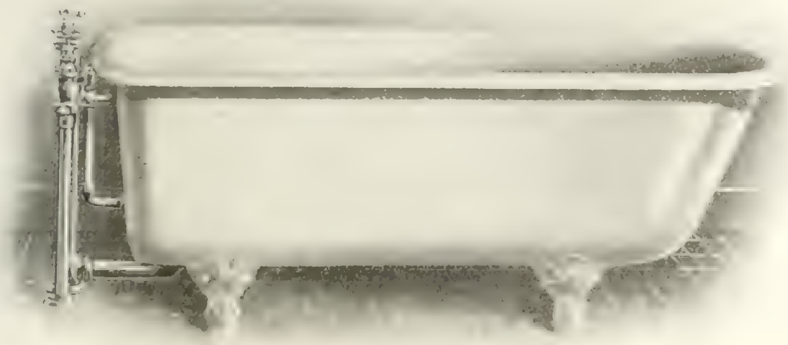
THE STANDARD COMPANY LIMITED

GENERAL OFFICES AND FACTORIES · PORT HOPE · CANADA



Europa Bath, 19 Inches Deep

96 of these baths supplied to

Freeman's New Hotel
St. James St., Montreal

Bathing in a 19 inch deep Bath covered to the neck instead of only over the limbs, is an inexpensive yet luxurious comfort.

Tell Your Customers

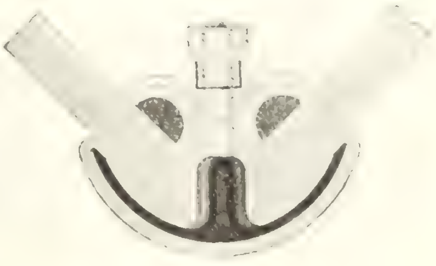
BRANCH OFFICES AND SHOW ROOMS

TORONTO
119 KING STREET EAST

MONTREAL
44 BEAVER HALL HILL

WINNIPEG
76-82 LOMBARD ST.

The Hester Corner Bar



No. 10

The One Perfect Bar

This is the only bar on the market that adjusts itself to any angle. Note the firm, even grip it takes on the two plates, and the self-adjusting half round moulding held in place by the inside copper stop, makes the bar a perfect fit for any angle.

Write for our catalog giving full description.

The complete Hester System of Metal Store Fronts, manufactured by the

Canadian Store Front Company

Queen and Peter Streets, HAMILTON, ONT.

FLEXIBLE COUPLINGS

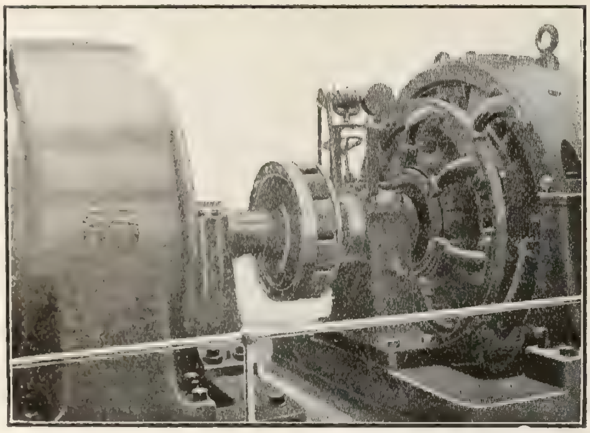
For High and Low Speeds

Save Power

Reduce
Running
Costs

Smooth Drive

Get Particulars from :



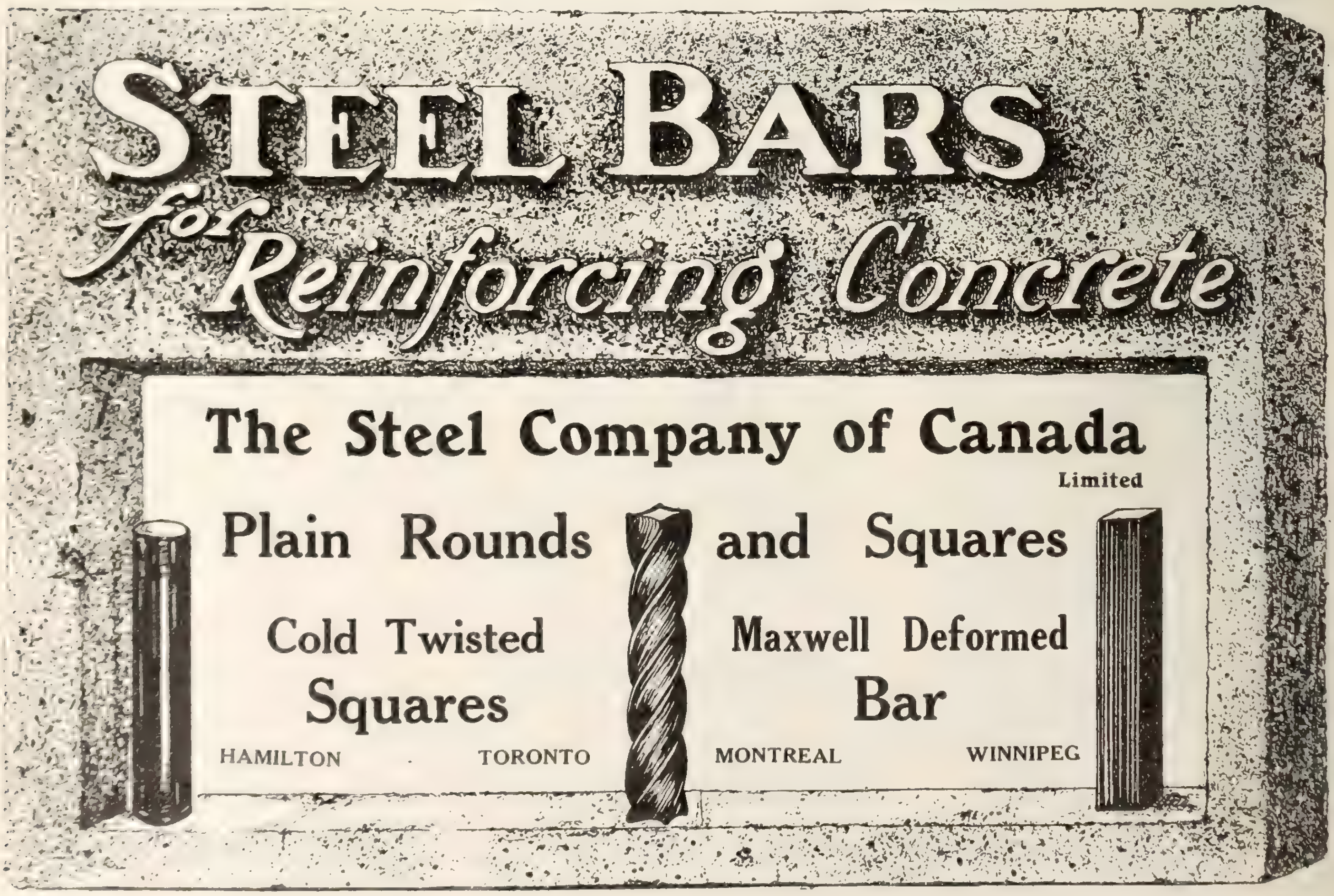
Suitable For

- Centrifugal Pumps
- Electric Motors and Fans
- Steam Engines and General Power Transmission

The Canadian Boving Co., Ltd.

Vancouver Office, 427 Seymour Street.

164 Bay Street, TORONTO



STEEL BARS
for Reinforcing Concrete

The Steel Company of Canada
Limited

Plain Rounds and Squares

Cold Twisted Squares

Maxwell Deformed Bar

HAMILTON TORONTO MONTREAL WINNIPEG

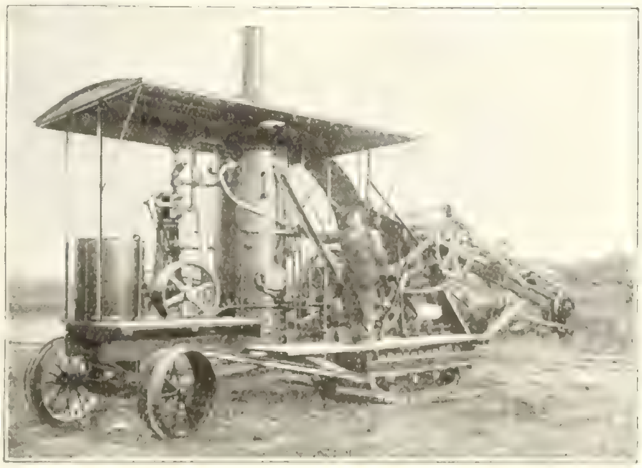
Wherever the Economies of Ditching receive consideration

the Ditching Machine has replaced hand labor and the contractor has to bid in competition with machine work. Soon he will have to do it everywhere. It is important, then, not merely to have a machine ditcher, but that he shall have the most efficient machine ditcher. The race is no longer between the man with a ditcher and the man with a shovel, but between two men with ditchers. **To win** is no longer a question of having some kind of a ditching machine, it **is the question of having the best** ditching machine.

We emphasize this thought because it is vitally important to contractors, and because it is the thought upon which the design of the

Austin Trenching Machine with Bank Sloping Attachment

has been worked out. It is an all-steel machine with working parts of special alloy steel. It digs, side slopes and cleans the ditch in one operation. **It has positively self-cleaning buckets and cannot clog. It is mounted on caterpillar tractions which will not mire.** It has dug three feet of frost, and the hardest adobe soil. It travels by its own power 1½ miles an hour. It **digs in ordinary soil up to nine feet** of **ditch per minute.** It is quickly and easily converted into a trench excavator for digging vertical trenches for tile drainage or sewers up to 2½ feet wide and 10 feet deep.



We specialize in ditching machinery both for open ditches and pipe line work. These various machines are known to contractors as the **"Austin Line"** manufactured by the **F. C. Austin Drainage Excavator Company,** comprising the following :

Drainage Excavator - Type A
Drainage Excavator - Type B
Levee Builder
Drag Line Excavator
Side Hill Ditcher
Highway Ditcher
Orange Peel Ditcher
Pipe Line Excavator
Farm Tile Ditcher
AUSTIN SEWER AND WATERWORKS EXCAVATOR
AUSTIN COMBINATION SLOPING or VERTICAL BANK EXCAVATOR

Full details in catalogue No. 208. Ask for it.

F. C. Austin Drainage Excavator Co.

Railway Exchange, CHICAGO, ILL. U.S.A.

Agents for Eastern Canada, Lecky & Collis, Napanee, Ontario.

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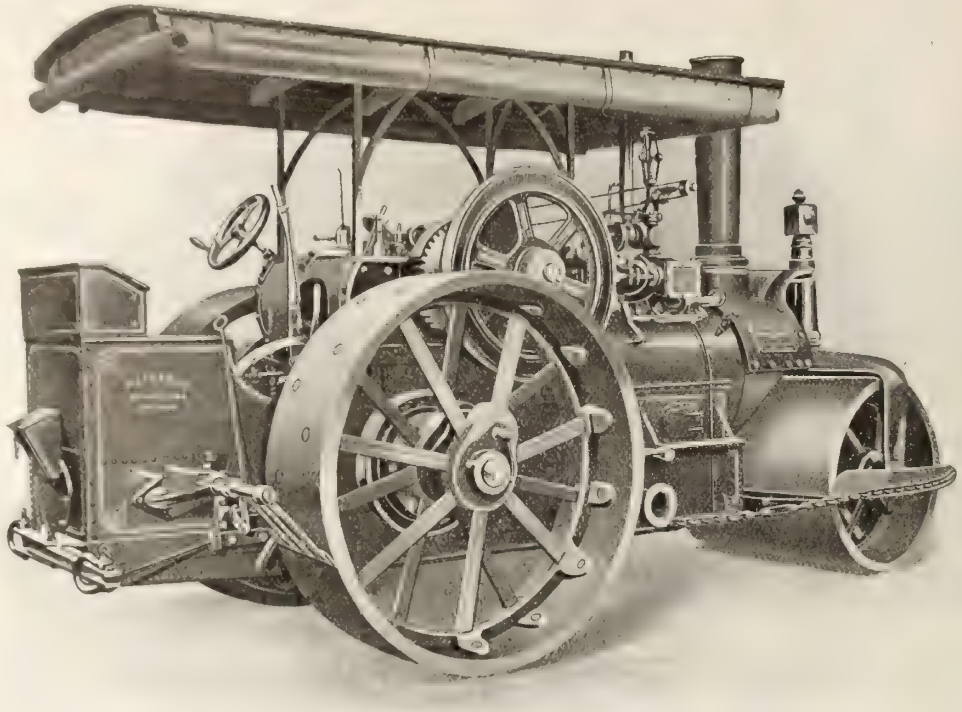

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"A Canadian Roller for Canadian Roads"

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Built in 10, 12 and 15 Ton sizes.

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We manufacture these.

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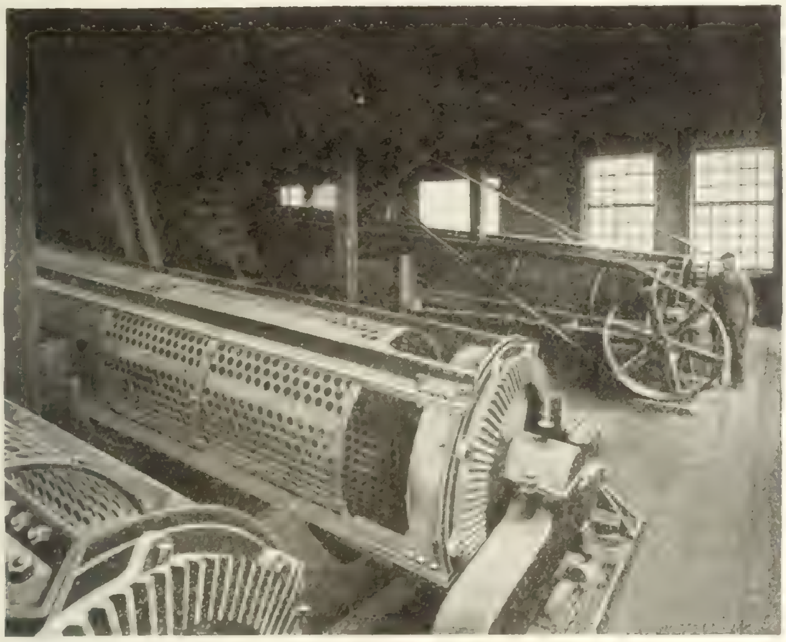

Interior View of Screen House—on Top of Bins—Showing Battery of Four CHAMPION Screens, Each 48" dia. and 28 ft. Long. Quarries of Doolittle & Wilcox, Dundas, Ont

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ROCK CRUSHERS—
Capacities, from 8 to 100 tons per hour—larger if required.

ELEVATORS—
Any desired capacity or length.

SCREENS—
Large or small to suit requirements.

Hoisting and Excavating Machinery, Steam Drills, Quarry Cars, Engines and Boilers—complete Quarry Equipment.

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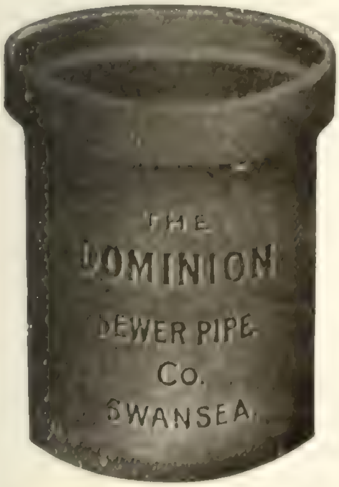

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Impervious to Water.

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Ask for Price List and Discounts.

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You can do it only if the bucket opens wide.
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POWERFUL CLOSING EFFORT

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Contracts executed for every description of Porous Terra-Cotta Fireproofing and Hollow Tile Work.

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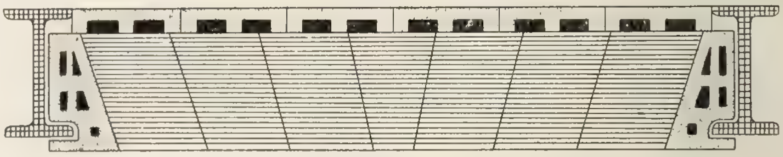
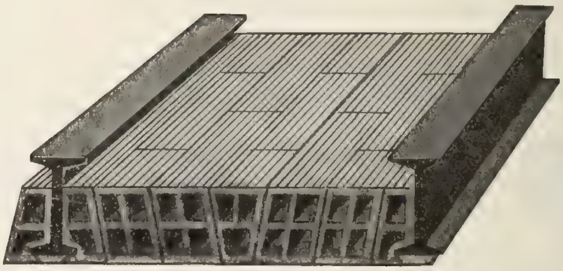


Type of Floor Arching—End Construction



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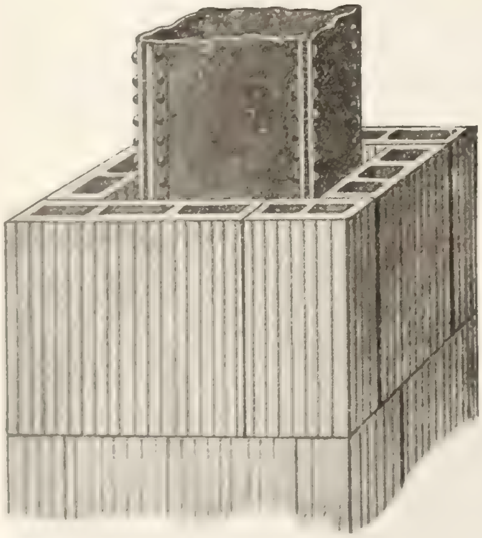

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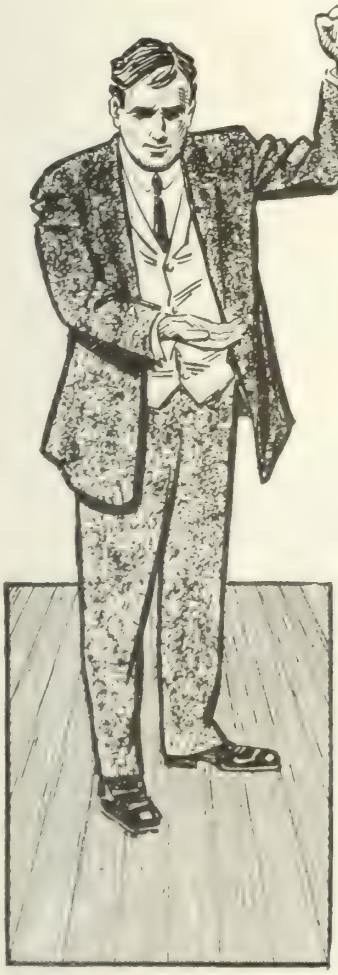

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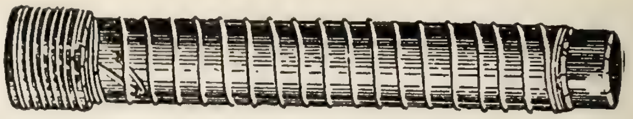

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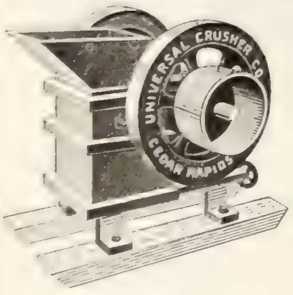

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Instantly adjustable to crush to any desired size from 2½ in. down to sand in one operation. Makes a uniform product in every size. Gives maximum capacity, using half the power. Recognized as standard. It will save you money.

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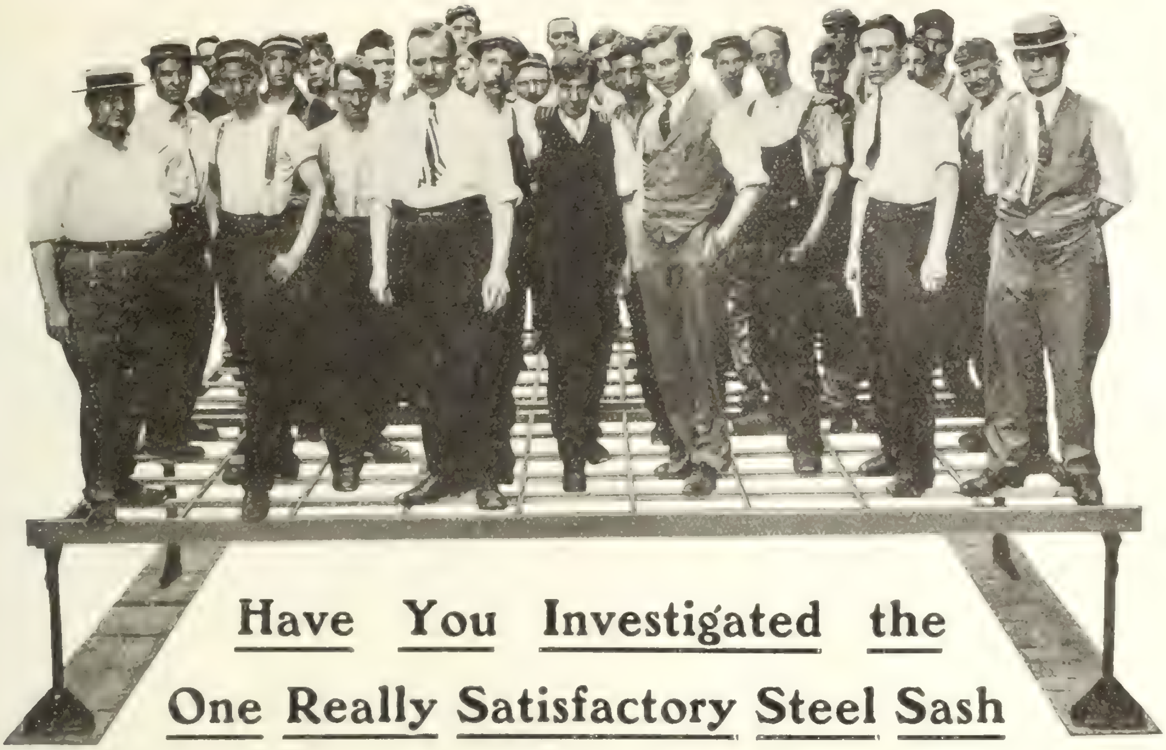

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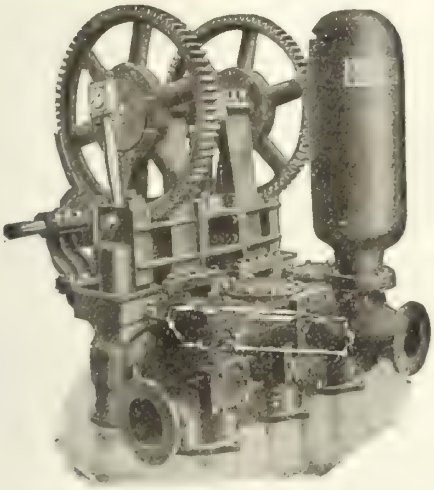

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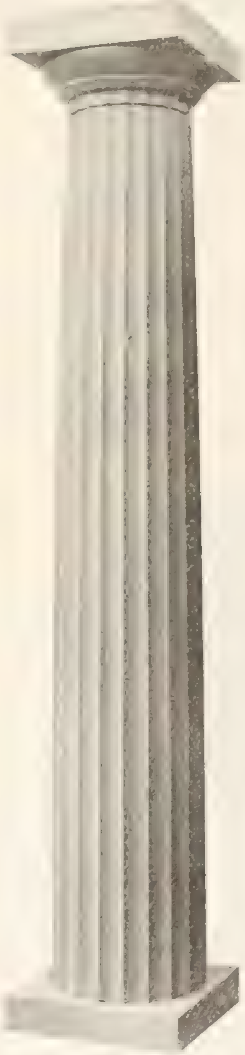

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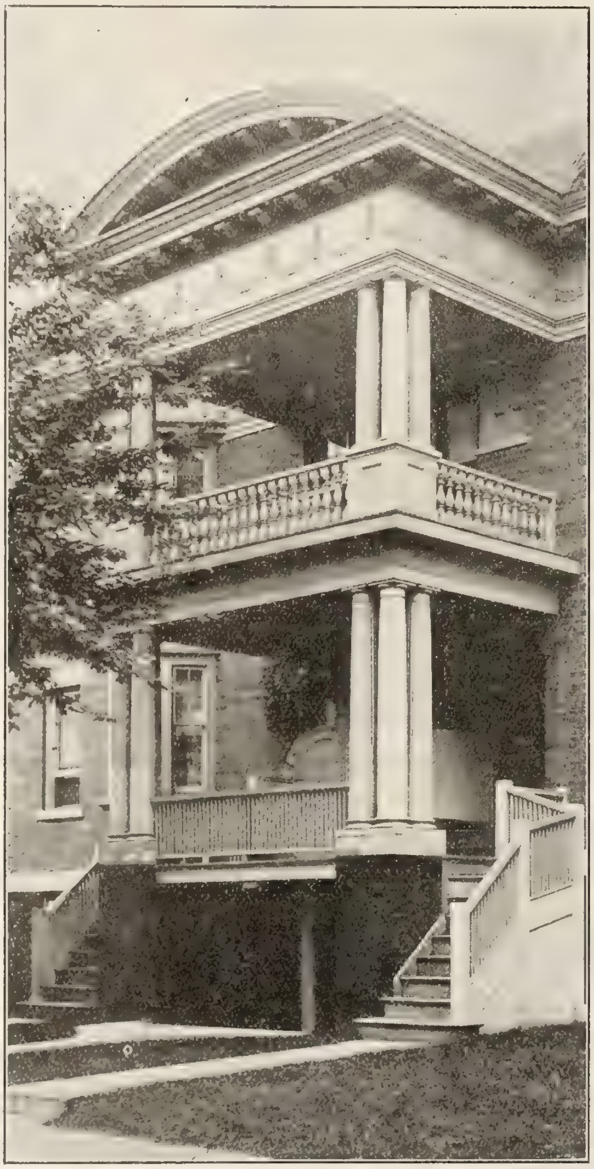

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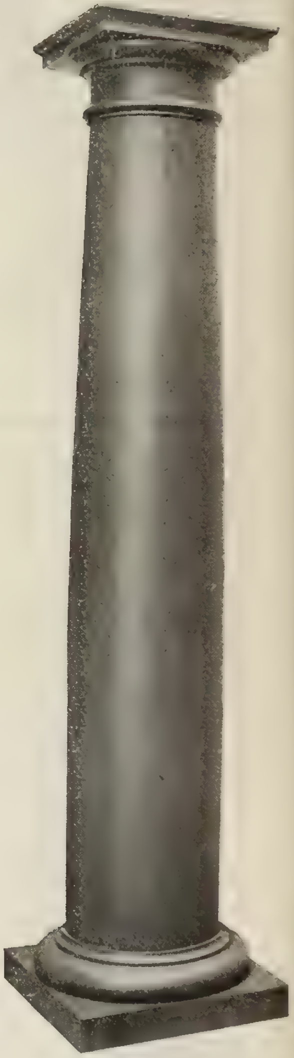

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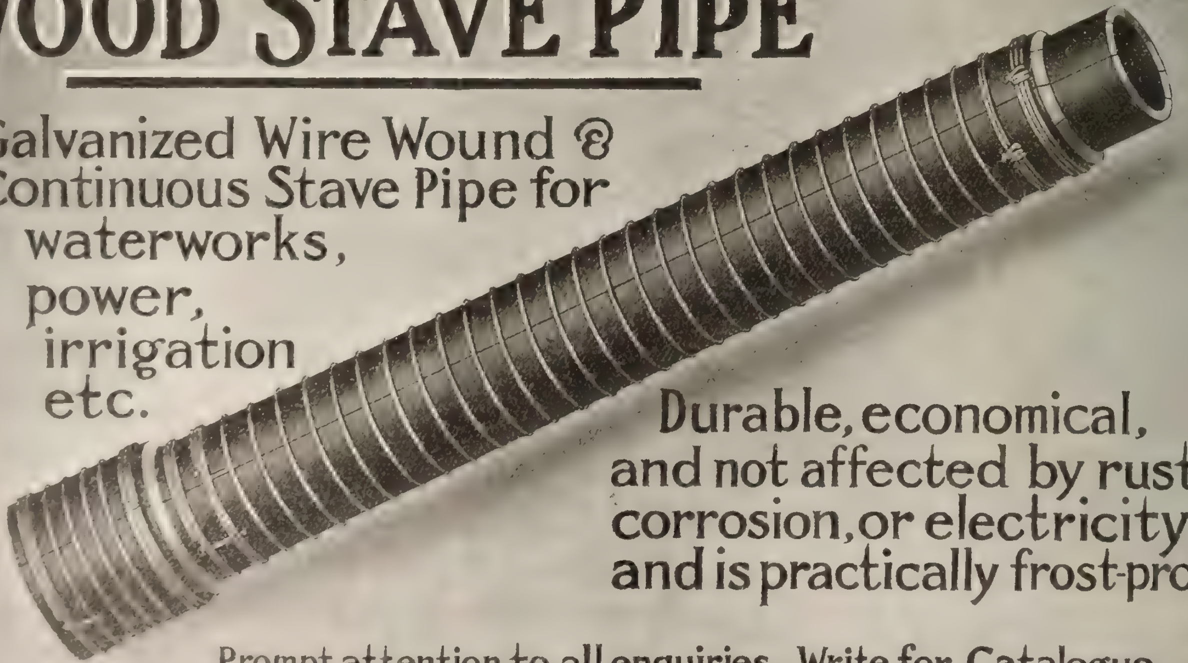

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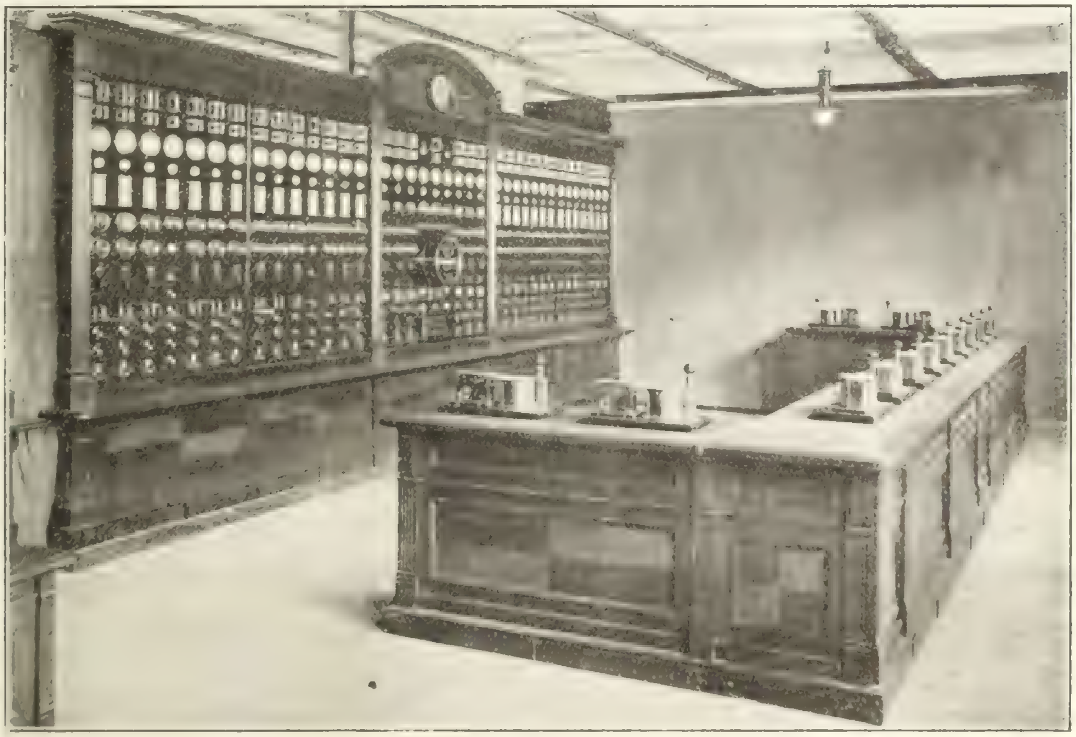

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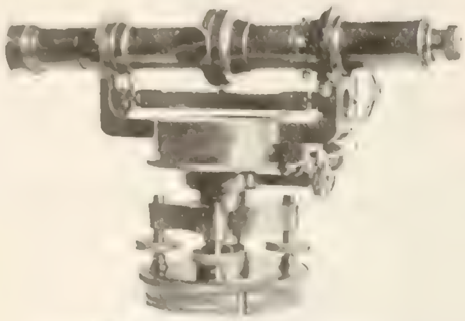

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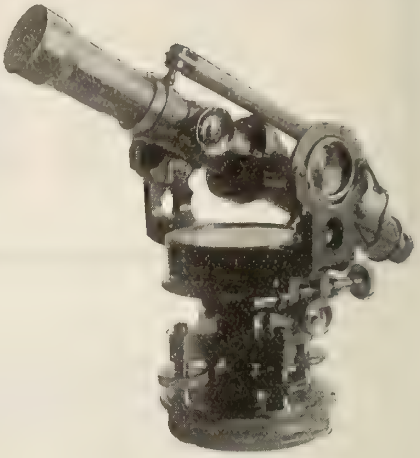

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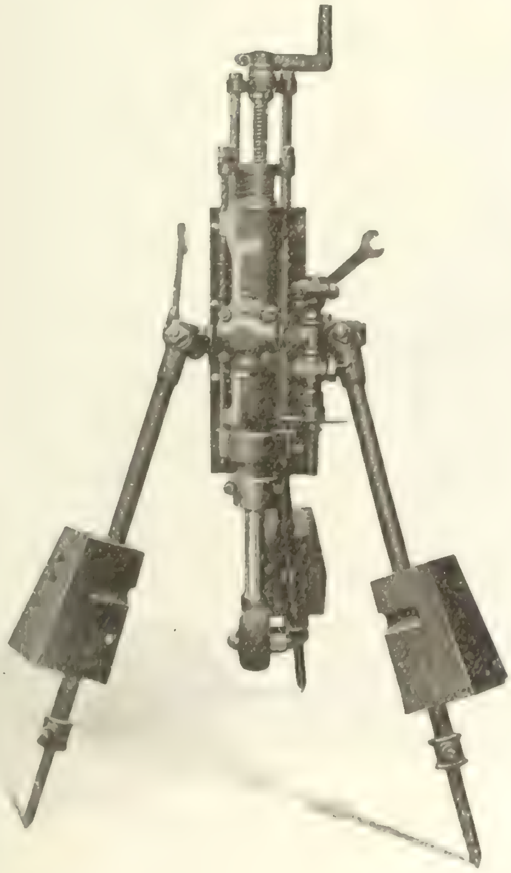

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Montreal Residence **J. A. Godin, Architect**

The Asbestos Mfg. Co., Limited
Eastern Townships Bank Building
MONTREAL

Please send me your catalog and booklet giving information on asbestos building material.

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Address____________________

C.R

17 City Engineers

tell their good opinions about "Canton" Shale Paving Brick in a Booklet

"What Experts say about Metropolitan Paving Brick"

Write us for Booklet—It's Interesting

"Quality is Economy" in Paving Brick

"Best Paving Block Made"

"Metropolitan Block" Make Permanent Pavements

The Metropolitan Paving Brick Co. - - - Canton, Ohio, U. S. A.

The above design is intended to be carried out in Cloisonne Glass, which is most effective for interior decoration.

Stained Glass

: : for : :

Church and Domestic Decoration

Art Leaded Glass for Conservatories

WRITE FOR SUGGESTIONS OF ART GLASS FOR ALL PURPOSES TO

The Cloisonne & Art Glass Ltd.

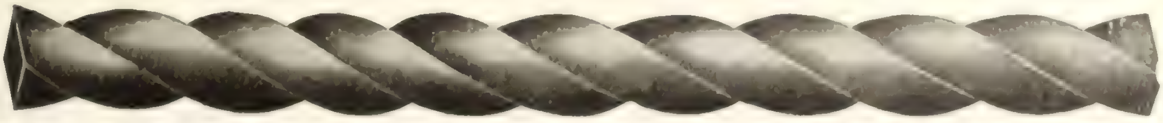
BERLIN - CANADA

Canada Steel Co., Limited, Hamilton, Ont.

(Independent of all mergers)

Manufacturers of **STEEL**

For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.



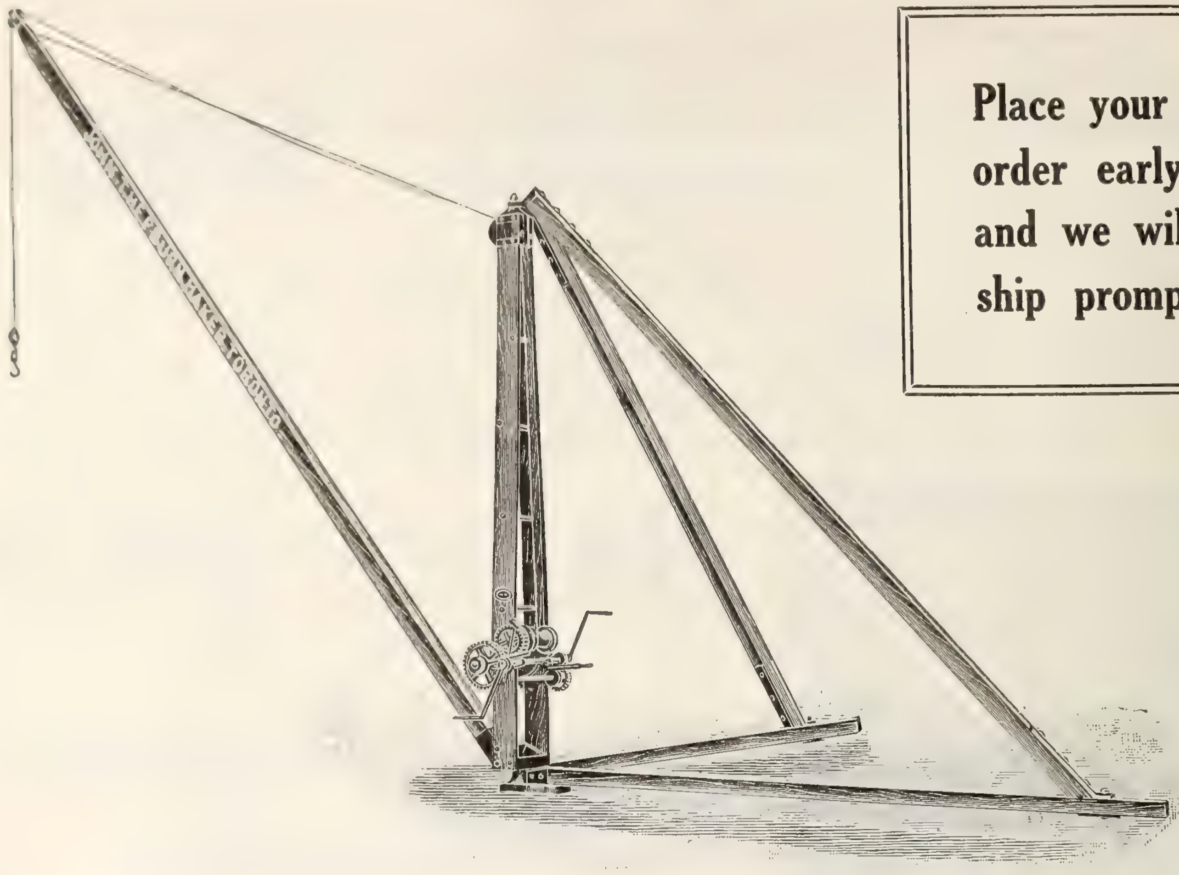
ANGLES from [illegible] in. up to 2 x 2 ins.
ROUNDS and SQUARE from ⅜ in. up to 1¼ ins.

We can ship from stock

FLATS from ¼ in. [illegible] other special sections.

Ask us for prices—they will interest you.

Office and Works: Sherman Ave., North


JOHN T. HEPBURN MAKER TORONTO

Place your order early and we will ship promptly.

The Proved Economy of Hepburn Scotch Derricks

If you cut the time upon a job and still do the job right, you are time and money in pocket. When you reduce labor by better methods and better equipment you also save time—and save money. You can get through more work, in less time, and at a better profit.

Hepburn Derricks represent bed-rock economy in construction work equipment.

They have weight where weight is needed. They have great strength. Yet every part is so well proportioned, so accurately and staunchly built, that a Hepburn Derrick is more easily operated and will do more work than any other derrick on the market.

Ask any man who has used them.

Made in standard sizes—one-half ton upwards. Interchangeable parts kept in stock for prompt shipment. Operated by hand or power. Fitted with single and double-purchase gears, band brake, and high-grade wire heaving rope. Interchangeable parts always in stock.

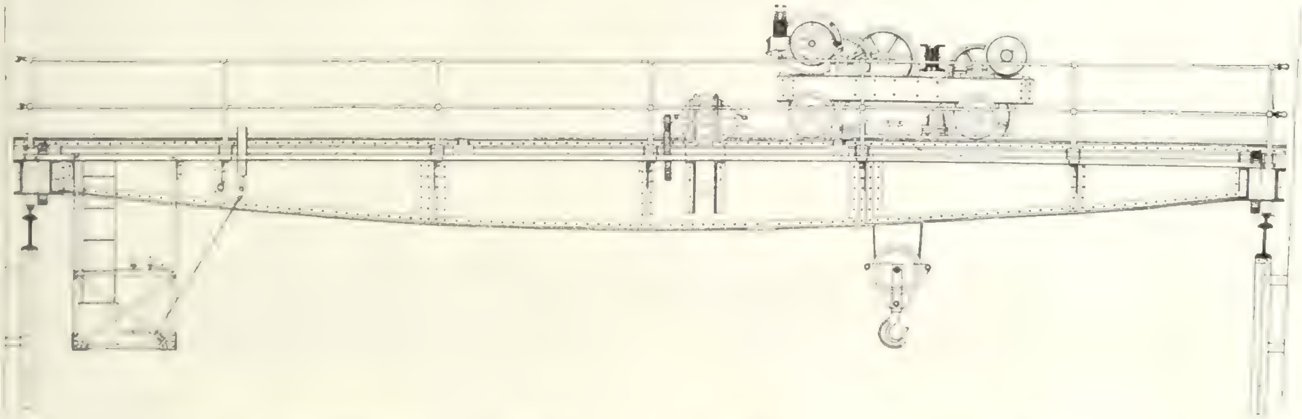
Iron Founder, Crane Builder and Machinist

JOHN T. HEPBURN

18-40 Van Horne St. Toronto, Can.

Let us Build that Crane

Hepburn Cranes are almost as well known to-day as Hepburn Derricks. We build Cranes of all kinds, of all sizes, and for all purposes and we build them as well as they can be built.



Standard Three-Motor Electric Overhead Travelling Crane

Our Crane experience is at your service. Give us particulars of your plant and the work you want done. We will recommend the type of Crane best suited to your purpose.

This is our Standard Three-Motor Overhead Travelling Crane.

All parts well proportioned and of rigid construction, giving large factors of safety.

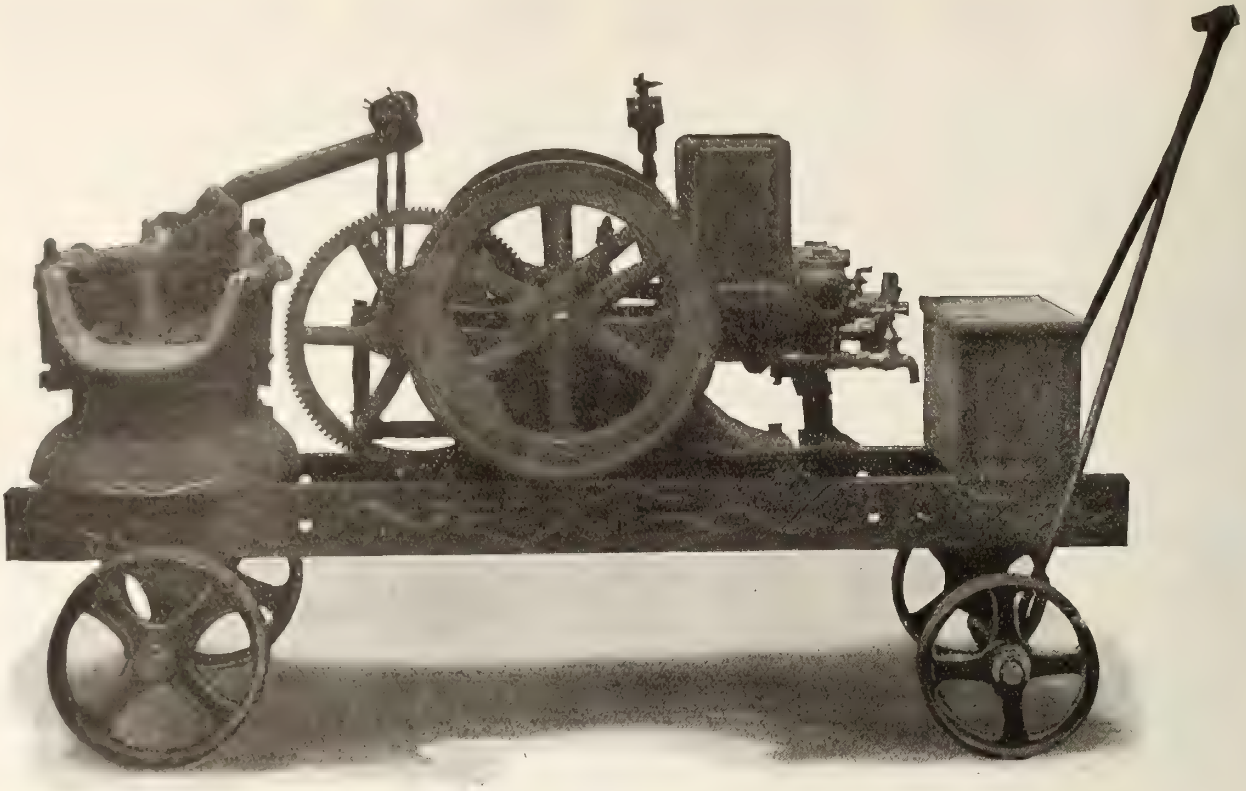
—Overwinding device. Gears all machine cut. All parts standard and interchangeable.

—Fitted with liberally rated, slow-speed motors and improved tramway type controllers.

Write for detailed specifications and prices.

JOHN T. HEPBURN Iron Founder, Crane Builder and Machinist

18-40 Van Horne Street, Toronto, Can.



The Domestic Combined Gasoline Engine and Diaphragm Pump, as illustrated above, is the last word in the economical handling of water from cellar excavations, sewers, etc., and is rapidly replacing the old style hand power, back breaking diaphragm pump, owing to its large capacity, simplicity and economy of operation.

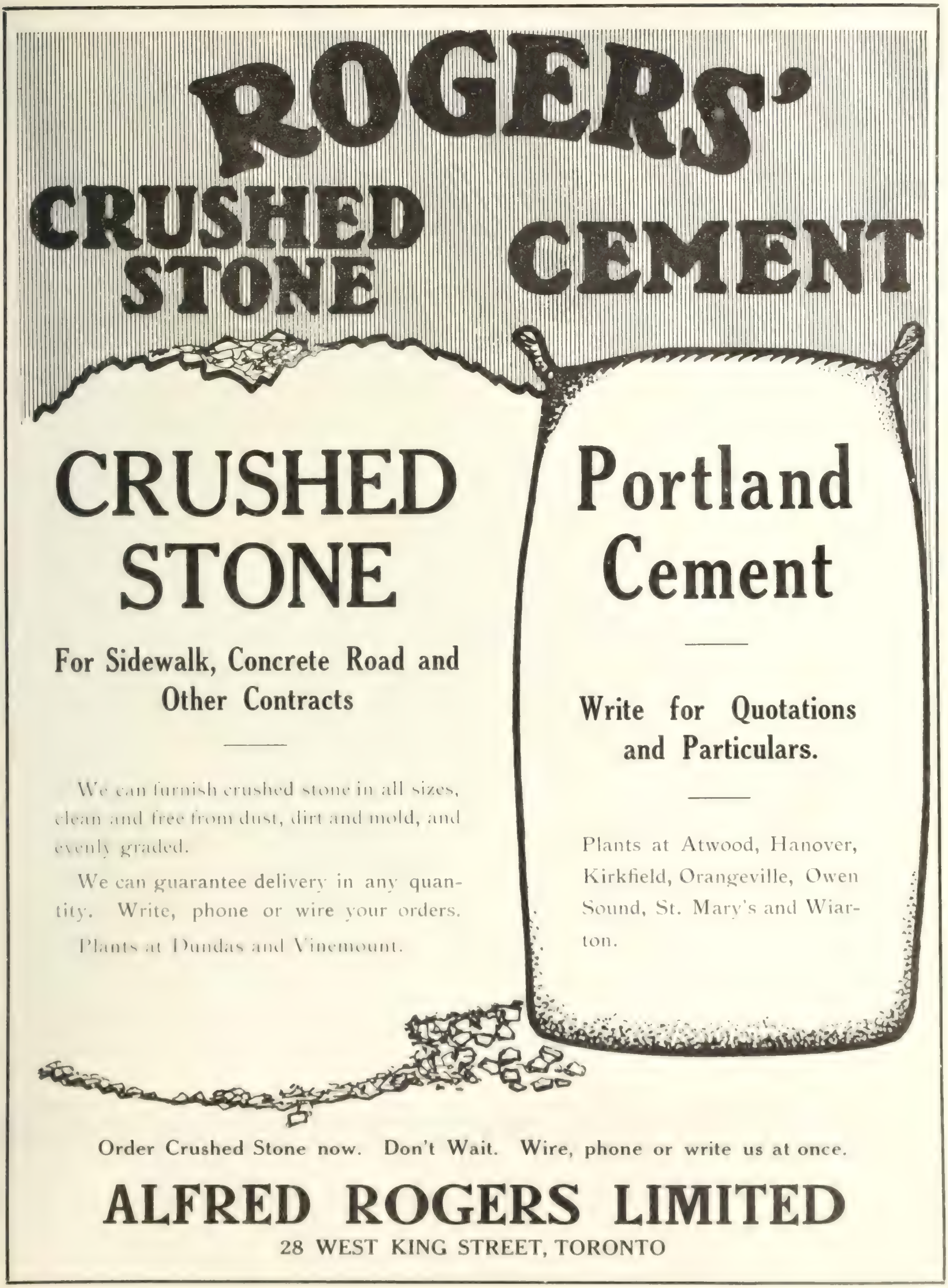
Capacity 3 in. suction		**Cost of operation**
3,500 gallons,	**per hour**	**2 cents**
35,000 "	**" day**	**20 "**

Let us demonstrate this to you.

The General Supply Company of Canada

Limited

Ottawa, Ont. Toronto, Ont. Winnipeg, Man.



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CRUSHED STONE

CEMENT

CRUSHED STONE

For Sidewalk, Concrete Road and Other Contracts

We can furnish crushed stone in all sizes, clean and free from dust, dirt and mold, and evenly graded.

We can guarantee delivery in any quantity. Write, phone or wire your orders.

Plants at Dundas and Vinemount.

Portland Cement

Write for Quotations and Particulars.

Plants at Atwood, Hanover, Kirkfield, Orangeville, Owen Sound, St. Mary's and Wiarton.

Order Crushed Stone now. Don't Wait. Wire, phone or write us at once.

ALFRED ROGERS LIMITED

28 WEST KING STREET, TORONTO

A Foreword to Our Canadian Friends

There are three copartners in the modern building whose interests coincide. These are the Owner, the Architect and the Contractor. Their interests are identical. We, as one of these copartners, address in this announcement, the other two.

We are mentioning here some of the buildings which have been executed by us in the past years. If we had failed in any of the earlier works we should not have been entrusted with the latter ones, as Owners and Architects do not endanger their finances and reputation by turning over work which involves millions to Contractors who are untried or who have failure written against any of their enterprises. The results we can show speak for themselves.

Three things of the utmost importance for you in your building operations are speed, safety and economy. Speed and safety make for economy, but both can be achieved without it. As an example of speed, we ask you consider the Fifth Avenue Building, which was completed within nine months after commencement. For safety, under the most dangerous circumstances, we ask you to consider the Metropolitan Life Insurance Company's Tower, extending over seven hundred feet above the sidewalk. These examples are of common knowledge. For economy, we know of no other way of obtaining proof than by asking our clients, the owners of the buildings, which we have erected.

We could not have done what we have without an organization of the highest type, and we beleive it is better and more highly developed now than at any time of its existence. We think that the results of our unequalled facilities for handling any kind of building construction without restriction as to its size or character is shown by the names of buildings mentioned. We welcome inquiries and interviews on any subject relating to building, and will be pleased at any time to give approximate or final estimates upon proposed work, or to give any information at our disposal to architects or owners.

We are now prepared to undertake construction work of any description in any part of the Dominion of Canada.

Hedden Construction Co.

Builders of Famous Buildings

Some of the Buildings we have constructed

Metropolitan Life Insurance Company's Tower, New York
City Investing Building, New York
Fifth Avenue Building, New York
Prudential Insurance Company of America, Newark, N.J.
Denver Post Office, Denver, Col.
Union County Trust Company Building, Elizabeth, N.J.
Peoples Building, Charleston, S.C.
American Bank Note Building, New York
Metropolitan Life Insurance Company's Archives Bldg., Bronxville, N.Y.
Alwyn Court (Apartment House) New York
44 West Seventy-seventh Street Building, New York
Van Schaick Building, New York
Fifth Ave.-Thirty-First St. Building, New York
Stockton Building and No. II E. Thirty-first St. Building, New York
Hollander Building, New York
Mr. E. S. Barlow's residence, Stamford, Conn.
Automobile Club of America, New York
Heywood Bros. & Wakefield Building, New York
Acker, Merrall & Condit Co., New York
Metropolitan Garage, New York
Tuttle & Bailey Manufacturing Company Building, Brooklyn, N.Y.
McClure Building, Long Island City, N.Y.
Proctor & Gamble Plant, Statem Island, N.Y.
Kent-Costikyan Wharehouse, Hoboken, N.J.
Public Service Corporation of New Jersey Power House, Marion, N.J.
Ferguson Library, Stamford, Conn.
Pelham Manor Railroad Station, Pelham Manor, N.Y.
Erie Railroad Piers, New York
West Shore Ferry Terminal and Piers, New York
Reservoir and Power House for Hon. John F. Dryden, Bernardsville, N.J.
In Canada Traders Bank of Canada, Toronto

Canadian Offices **Board of Trade Building**
MONTREAL

FERRANTI LIMITED

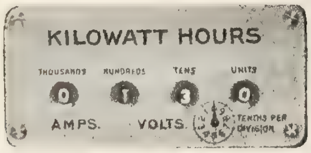
Electrical and General Engineers

Manufacturers of Complete Switchboards, D. C. or A. C. up to 60,000 Volts, Transformers, Meters, Auto Starters, Switches, Circuit Breakers, etc.

Ferranti Meters

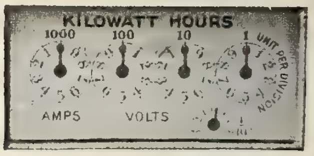
The meter with the world-wide reputation for

Accuracy Durability Reliability



CYCLOMETER

versus



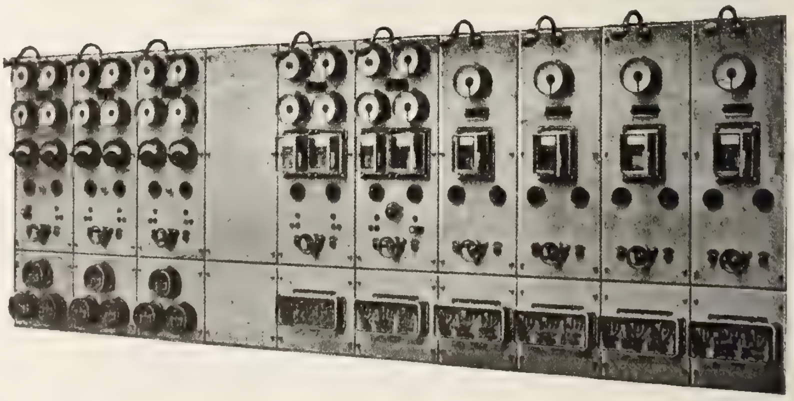
CLOCK DIAL

ADVANTAGES:

1.—Avoids all possibility of errors in reading.
2.—Speed, accuracy, and reliability of reading.
3.—Misplaced or lost pointers impossible.
4.—Skilled meter reader unnecessary.
5.—Satisfaction of consumer who is able to check his own meter.

Switchboards

The illustration shows a Ferranti High Tension Electrically Operated Switchboard. This type of board is installed in many of the world's largest power plants. We build switchboards to any specification.



If you are in the market for any kind of Electrical Equipment, send us your specifications and let us quote you.

Canadian Representative:

GEORGE C. ROYCE, West Toronto, Ont.

Announcement
of the
Standard Underground Cable Co., of Canada, Ltd.

Canada's New Industry

On or about May 15th 1912, our new plant at Hamilton, Ontario, will start operation. Our Bare Wire Department will be ready to meet your requirements on that date and other departments will be started as rapidly as possible. Within three months from the above date we expect to have the complete plant running and able to meet, promptly and satisfactorily, your every requirement for the following materials ;

Standard Products

Copper Rods
Bare Wire and Cable
Standard C.C.C. Wire
(Colonial Copper Clad)
Magnet Wire
Weatherproof Wire and Cable
Rubber Braided Wire and Cable
Varnished Cloth (Cambric) Cable
Cable Systems Installed Complete
Fibre Insulated Leaded Cable
Dry Paper Leaded Cable
Saturated Paper Leaded Cable
Rubber Lead Covered Cable
Armored Cable
Terminals and Junction Boxes
Splicing Tubes and Compounds
Insulating Tapes and Varnishes
Cable Hangers, Supports, etc., etc.

The rapid growth of the Canadian business of the Standard Underground Cable Co., of Pittsburg, Pa., U.S.A. has required the establishment of a Canadian company, which will employ Canadian workmen. This company will, by close alliance with its associate American company, benefit by its experience of the past as well as future, and will maintain in every respect the high quality of its products as has been done by the latter in its 30 years of successful manufacturing experience.

Standard products are specified and used by the most prominent and most particular Canadian Engineers, Architects, Contractors and Buyers. Ask a User !

Before you buy get Standard prices and literature. Just mail a card.

Standard Underground Cable Co., of Canada Ltd.

Department I **Hamilton, Ontario**

Vitrified Salt-Glazed Sanitary Sewer Pipe Best for Sewers

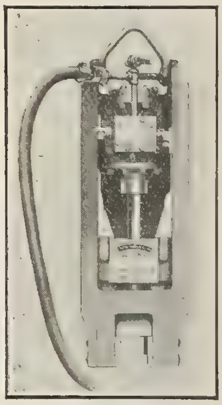
Kansas City, after four months of public investigation during which the best experts on sanitation and representatives from the chief testing laboratories of the country testified, concluded that "approved sanitary engineering requires that the best commercial product should be used". . . . "that the best material to be used in the sewers of Kansas City is vitrified salt-glazed pipe."

As an engineer, the full report of the committee, with extracts from the testimony will be of great interest and value to you. Send for it and our other interesting books.

The Kansas City Report on Sewer Materials—free
Sewer Facts—free
Sewer Specifications—12 cts. for postage

The Clay Products
Publicity Bureau
821 Wall St. - Kansas City, Mo.

No. 3 DRIVING 8″ x 3″ Tongued and Grooved Sheeting



New Monarch Steam or Air Pile Hammer

It is the quickest acting Hammer on the market and strikes the heaviest blow.

For further particulars write

Henry J. McCoy Co.
65-67 Dey St., NEW YORK CITY, N.Y.

Only Reliable Suction Hose

If you are in the market for **hose,** don't do a thing until you look into the money-saving reasons why you should buy

GOODYEAR Suction Hose

Money-Saving Hose for Contractors, Miners, Dredgers and Others Demanding Hose-Permanency and Hose Strength.

A few of the lines we manufacture

Longer service, more ***stand-up-ability,*** greater freedom from constant repairs, would make Goodyear Suction Hose an economy at double the price. But it ***costs no more*** than the other kinds.

Non-Collapsible Non-Rotting

Goodyear Suction Hose never caves in. It is built by a process that makes this impossible no matter how long the hose has been in use. It is built around a heavy steel spiral wire imbedded in the inner tube. Tube can't separate from wire nor can dampness reach it. Hence, rust and rot, one of the common failings of other makes of suction hose, is ***done away with.***

Suction Hose for Oil and Gasoline

We make rough or smooth bore Suction Hose for all purposes; also a complete line of

Water, Steam and Air Hose

Send at once for our catalog. If you are in doubt as to what kind of hose you need, let our expert help you solve your problem. **Our sales of the last four months 50 greater than those of last year. Defective goods returned only $23.93.** Write us to-night.

The Goodyear Tire & Rubber Company of Canada, Ltd.

General Offices Toronto **Factory Bowmanville, Ont.**

Write Our Nearest Branch

BRANCHES: Montreal Winnipeg St. John, N.B. Vancouver Calgary Victoria, B.C., 855 Fort St.
Regina, Sask., 2317-2318 South Railway St. Hamilton, Ont., 127 King St. West.

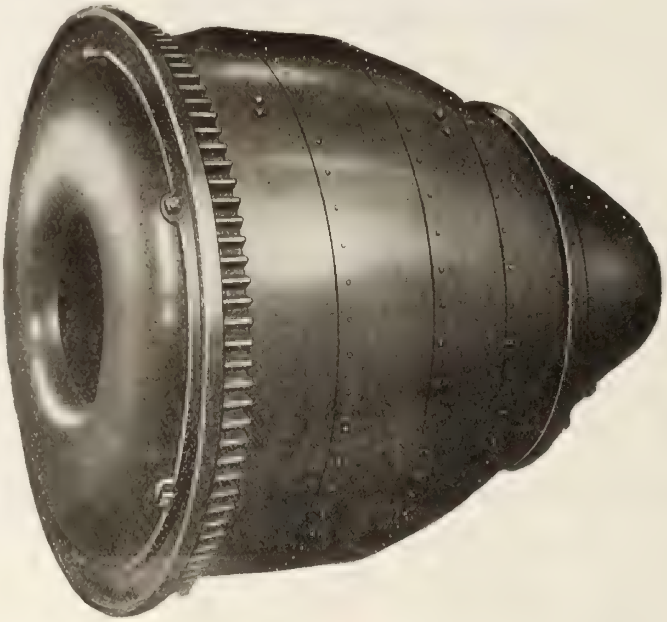
THE "HEARTSHAPE" DRUM

The Heartshape Drum

turns the batch end for end very quickly, which is the only positive means of mixing any kind of material uniformly.

NOTICE THE SHAPE —COULD IT BE OTHERWISE?

This shape of drum makes an even distribution of the weight of the batch of concrete, thereby lessening the strain on any particular point.

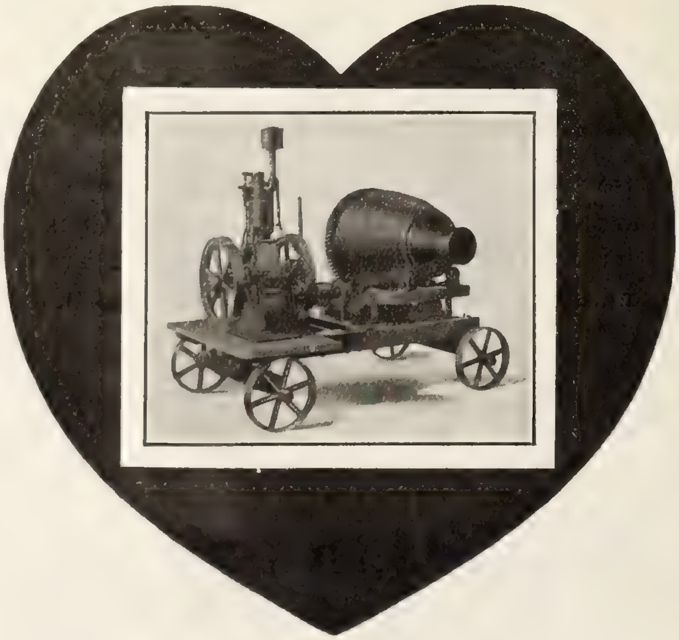


The Heartshape Drum

Every detail of the design and construction of this "Heartshape" drum makes for great strength and long life. The wide overlap in the seams as shown in the cut gives it 100% more strength and makes wearing-out almost an impossibility. **Test after test has proved its efficiency**

See the Little Mixer in the Cut

Contractors, if you have any concrete or fine work, especially top dressing of sidewalks, brick or block work, or fine mortar, you cannot afford to be without this machine. Come and see it.



A One Man Operation

The absence of all complicated working parts in the Wettlaufer "Heartshape" Mixer reduces the liability of a breakdown to a minimum, and renders it easy to control. **The entire machine is operated by one man.**

Don't Hammer, Scrape or Cut.

Save yourself all trouble by having a New Improved "Heartshape Mixer." It will never clog—it cleans itself at every batch. It will mean a Wettlaufer in the end—why not NOW.

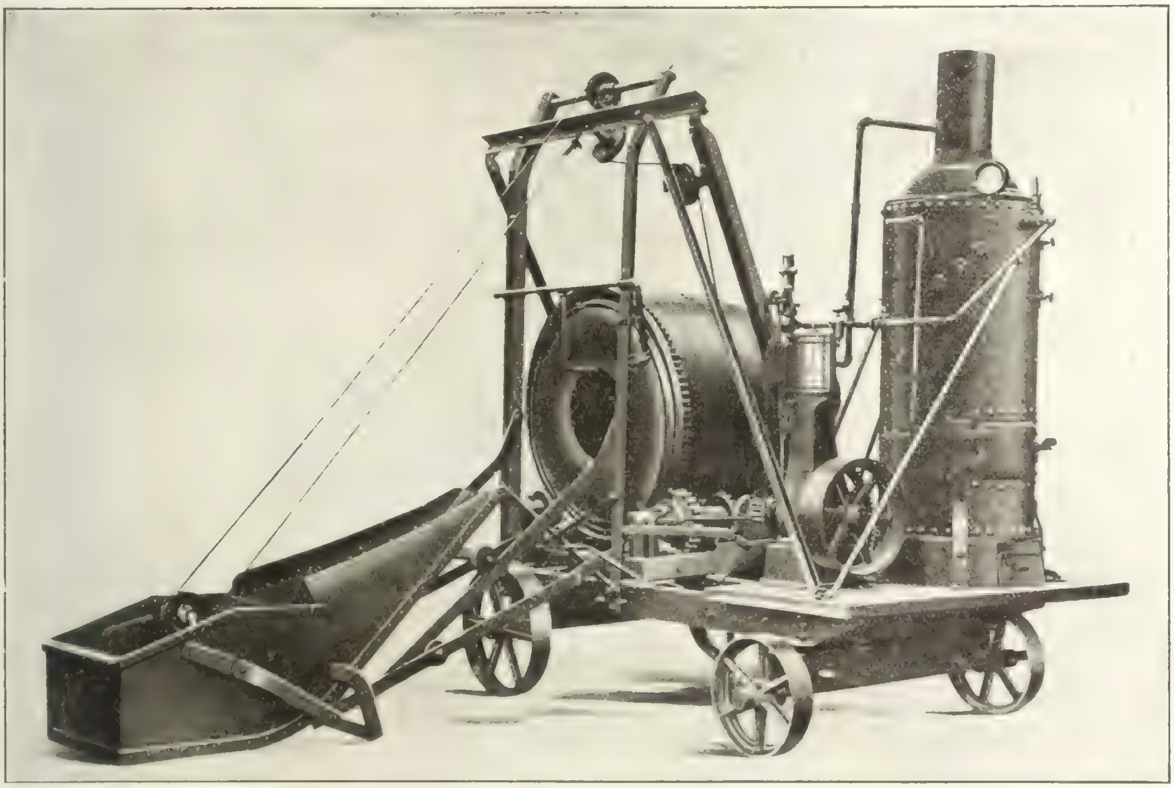
Factories:
Buffalo, N.Y.
Mitchell, Ont.
Detroit, Mich.

WETTLAU

Sales Manager for Quebec: **G. O. McDonell, 2059 Mance St. Montreal, P. Q.**

WETTLAUFER

Heart Shaped Mixers



The purchase of a reliable mixer of recognized make at the outset of a contract will save you money and time all along the line

The Wettlaufer Heart Shaped Mixer means:

**Low Cost of Maintenance,
Capacity, Strength and Durability**

Our New Automatic Dumping Device means, **rapid discharge, greater capacity** with **reduced labor.**

Our new loading device is

Quick, Positive and Perfect

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi steel castings.
With our new oiling system all bearings are fed direct from the centre of the bearing By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

FER BROS.

Agencies:
HOOTON & MOORE
710 Builder's Exchange, Portage Ave.
Winnipeg, Man.

A. R. WILLIAMS MACHINERY CO.
15 Dock St., St. John, N.B.

Head Office: Toronto, Ont., 178 Spadina Ave.

MEDUSA

WHITE
PORTLAND
CEMENT

STAINLESS

SANDUSKY
PORTLAND
CEMENT
COMPANY

Medusa Waterproofing

A dry powder, to be thoroughly mixed dry with dry cement before sand and water are added, thus becoming an inseparable part of the concrete.

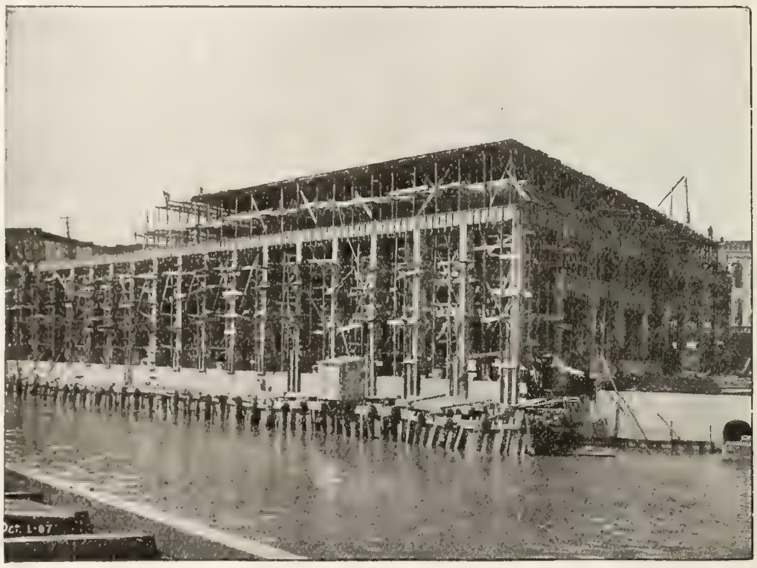
Medusa Waterproofing Gives Absolutely Permanent Results. Does Not Affect Strength, Setting or Color of Portland Cement.

MEDUSA

WHITE
PORTLAND
CEMENT

STAINLESS

SANDUSKY
PORTLAND
CEMENT
COMPANY



BOSTWICK-BRAUN HARDWARE CO. BLDG., TOLEDO
Medusa Waterproofing used in the basement, walls and floors, 20 ft. below river level.

Medusa Waterproofing is a dry white powder, and therefore in convenient form for shipment, storage and use. Owing to its extreme fineness it may easily be perfectly mixed with cement in the necessary proportions. This is the *original concrete* waterproofing patented in 1907. The success of Medusa Waterproofing has caused numerous imitations and infringements to spring up, and suits against the manufacturers of several of these are now pending. The dry powder system of waterproofing is far superior to the use of any of the so-called waterproof compounds in liquid or paste form, as these are generally difficult to mix with the water used, and many of them are practically worthless as waterproofing substances. A trial will convince cement users that Medusa Waterproofing, in dry powdered form, is the only true preventive of dampness in concrete. The everlasting quality of its waterproofing effects is due to its being absolutely insoluble and unaffected by water even after years of contact. Permanent water-resisting qualities are obtained with less than one-fourth as much Medusa Waterproofing as is required of other so-called waterproof compounds to produce an apparent and temporary effect.

Manufactured in Canada by

Stinson-Reeb Builders' Supply Co., Limited

9th Floor Eastern Townships Bank Building - MONTREAL, P.Q.

We want Agents in Every City and Town to Handle this Material.

ESTABLISHED 1886

Contract Record and Engineering Review

PUBLISHED EACH WEDNESDAY BY

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THOMAS S. YOUNG, General Manager.
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Page 16

Vol. 26 April 24, 1912 No. 17

Introductory

In presenting to the constructional interests the Special Annual Number of the Contract Record and Engineering Review, we do so well knowing that in the searching light of modern criticism it will not be found infallible; that its pages will not be wholly devoid of error—whether of a technical or typographical nature; that indeed, perhaps, it will be remarkable as much for what it does not contain as for what it does.

But infallibility is a virtue to which no human institution can establish a claim; error has been with us since the beginning of all things, and the omissions only leave the more ground upon which we may direct our future effort.

In the preparation of the material presented in this issue we have experienced the most gratifying co-operation from all connected with the various phases of development work, and to these we would offer our sincere thanks. While the part of this journal is an impersonal one, there are times when a personal word is justifiable—when one feels that the thanks that are expressible in the third person are not sufficient return. Success in the journalistic as in every other field depends largely upon co-operation, and in this respect we have met with gratifying encouragement.

With the rapid advances that are being made in the Canadian constructional field we may hope for greater attainment. We are entering upon a new year of work and we shall endeavor therein to make each succeeding number an improvement on its predecessor. It is our ambition to play a really practical part in the advancement of engineering knowledge and in assisting contractors to the readiest and most economical solutions of their problems. We shall aim to make our pages representative only of the most approved construction, and to disseminate timely and accurate information concerning the supply and labor markets in the various cities.

We give this brief outline of our ideas as a guide to those who have been good enough to extend their co-operation to us in the past. To those who find such discourse wearisome we offer our apologies; and to those other friends, once more our thanks.

Trade Conditions and Prospects

For a decade or more we have become so accustomed to establishing new records that it is almost a commonplace to predict that 1912 will eclipse the performances of previous years in the Canadian construction field. But after all, this very commonplace is one of the most significant things connected with the development of our country. Year by year we go on attaining greater heights and still reaching out for further eminences. Our opportunities are immeasurable; our confidence in our country is supreme. The only danger lies in the possibility of our becoming inured to normal progress and in failing through the very magnitude of our aspirations.

The records of our principal cities and works departments show that hitherto our general growth has been normal, if vigorous and healthy. As a single instance one may quote the building returns of the city of Toronto which for years have shown a steady increase of about 16 per cent. The leaps and bounds by which certain western cities have progressed is regarded by some as being disproportionate, but little else could be expected of a country that is universally regarded as one of the richest and most opportune in the world.

The opening of the construction season was never attended by more favorable conditions than the present. There has been a general improvement of business, not only in this country, but in the United States, also, and it is reasonable to assume that the building interests of Canada will be greatly benefited thereby. The disturbing elements in the labor world are few, and there is little chance of any upheaval in the prices of the principal building commodities. In spite of the unusually severe weather experienced in the early part of the year, the building returns for thirty-two leading Canadian cities for the first quarter of 1912 show an increase of nearly 12 per cent. over the corresponding period of 1911, which was regarded as a banner building year, particularly in the earlier stages. The quarterly returns to which we have referred are respectively $11,406,015 and $10,208,114. All things considered it is fair to regard the 1912 total as the herald of great prosperity during the active building months. Contracting work promises to be exceptionally active in every branch of construction, and it is impossible to discriminate in favor of any particular department. The various railroads have a programme that will involve the expenditure of nearly $100,000,000; the Dominion and Provincial Governments are undertaking road work that will cost something like $35,000,000; the municipalities, in the case of all the larger cities, are entering upon a season of record magnitude, while the Building Inspectors throughout the country are unanimous on the score of increased business.

Financial conditions are generally [illegible]

Construction of the Rotherhithe Tunnel

Detailed Description of Great Engineering Work which took Four Years to Complete and which cost Ten Million Dollars

Specially Contributed by Sir Maurice Fitzmaurice, C.M.G., Engineer to the London County Council

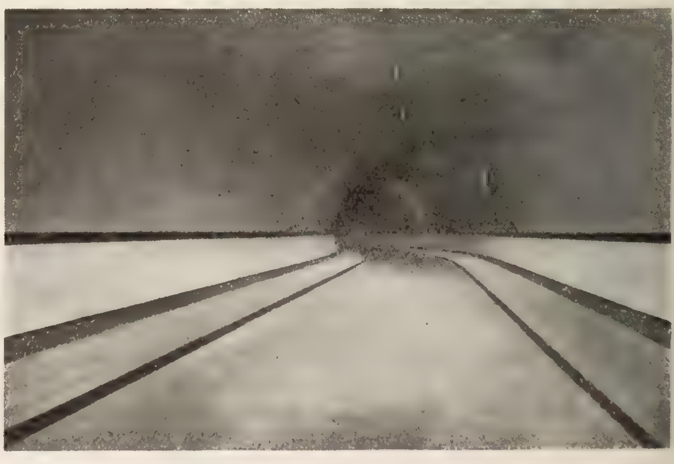
THE River Thames, in the neighborhood of Rotherhithe and Wapping, has been of interest to engineers in connection with the construction of tunnels on at least three occasions. In 1805 a tunnel between Limehouse and Rotherhithe was commenced by Vazie. A shaft was sunk and a heading driven under the river for a distance of more than 1,000 feet, but the river then broke in and the work was abandoned. In 1825 Brunel commenced a tunnel between Wapping and Rotherhithe, for many years known as The Thames Tunnel. This tunnel was of very great interest, owing to the difficulties met with, and also because it was the first occasion on which a shield was used for such work. The river broke into the tunnel several times during construction, and after a serious irruption on the 22nd August, 1828, the work was stopped until January, 1835, and was finally completed in 1842. This tunnel was built of brickwork, and, as compressed air was not in use at that time, all the water met with had to be dealt with by pumping. Considering the difficulties which are met with at the present time in constructing tunnels by means of shields shoved forward by hydraulic power, the use of compressed air to keep out the water, and cast-iron for the lining of the tunnel, it seems almost extraordinary that Brunel's Thames Tunnel should have been completed at all. This tunnel is now used by the East London Railway.

Sir Maurice Fitzmaurice, C.M.G.

The Rotherhithe Tunnel provides a carriage-road and two footways underneath the Thames, commencing at Lower-road, Rotherhithe, and terminating in Commercial-road, Stepney, thus uniting two of the busiest thoroughfares on the north and south of the river, along both of which the London County Council trams run. It will be seen on the plan that the line of the tunnel runs just to the west of the entrance to the Surrey Commercial Docks and just to the east of the entrance to the London Docks, and it will therefore give increased facilities for the distribution and collection of goods all over London in connection with these docks. At the present time, it is necessary, in the case of cart traffic between the two sides of the river at this point, that a long round should be made either by means of the Tower Bridge or by the Blackwell Tunnel, the former being one and a half miles above the Rotherhithe Tunnel and the latter, two miles below.

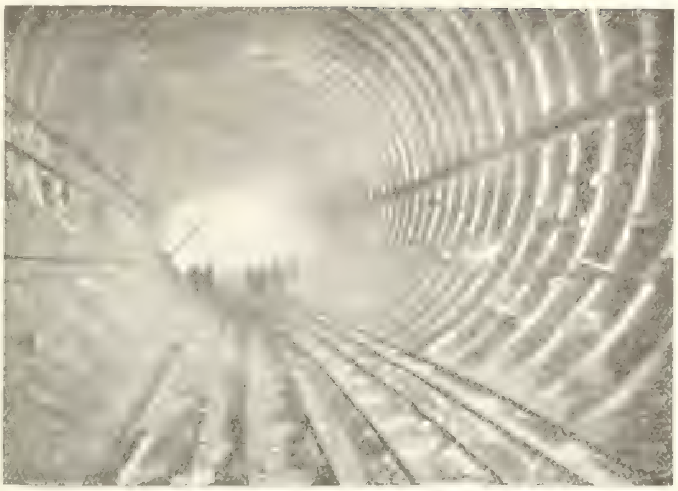
The total length of the tunnel is 6,883 feet, of which 2,020 feet is open approach, 1,122 feet cut-and-cover, and the remainder 3,741 feet, tunnel lined with cast-iron and concrete. The under-river portion, about 1,500 feet long between the shafts, crosses under the River Thames in a diagonal direction. In addition to that portion of the tunnel actually under the river, very great difficulties with water were encountered in the approach tunnels for very long lengths on each side. In the centre of the Thames the tunnel is only about 7 feet below the bed of the river. In the case of the Blackwell Tunnel the Thames Con-

Gauge arch, made of cutting edges of shield



Portion of the completed tunnel

Entrance to south side of tunnel



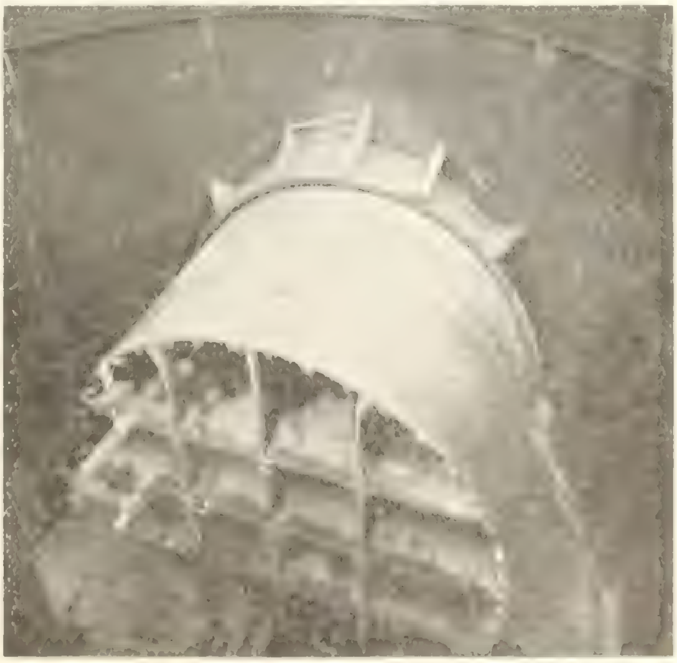
Cast iron lining of tunnel. Roadway not begun

servancy allowed about 10 feet of clay to be placed on the river bed while the tunnel was under construction, so as to give more cover overhead. In the present case, owing to the work being constructed opposite both the Surrey Commercial Docks and the London Docks, the Thames Conservancy were unable to give permission for any clay to be placed on the bed of the river. The work, therefore, had to be carried out with the greatest possible care, and every precaution possible was taken to ensure the safety of the men in the tunnel in the event of the seven feet of sand between the top of the tunnel and the bed of the river giving way during construction, and so carefully was the work carried out that at no time did the river break in. That part of the tunnel underneath the river was completed in nine months, and on several occasions as much as 12 feet 6 inches of tunnel was constructed in the twenty-four hours, and 267 ft. was completed in the month of October, 1906.

The tunnel lining is composed of cast-iron segments bolted together, each ring of segments being 2 ft. 6 in. long in the direction of the tunnel, and 14 segments and a key piece forming each ring. The metal in the body of the segments is 2 inches thick and the flanges are 14 inches deep. The outside diameter of the cast-iron lining is 30 feet, and it may be noted that this is the largest subaqueous tunnel ever constructed. The total weight of cast-iron used in the lining of the tunnel was 27,000 tons.

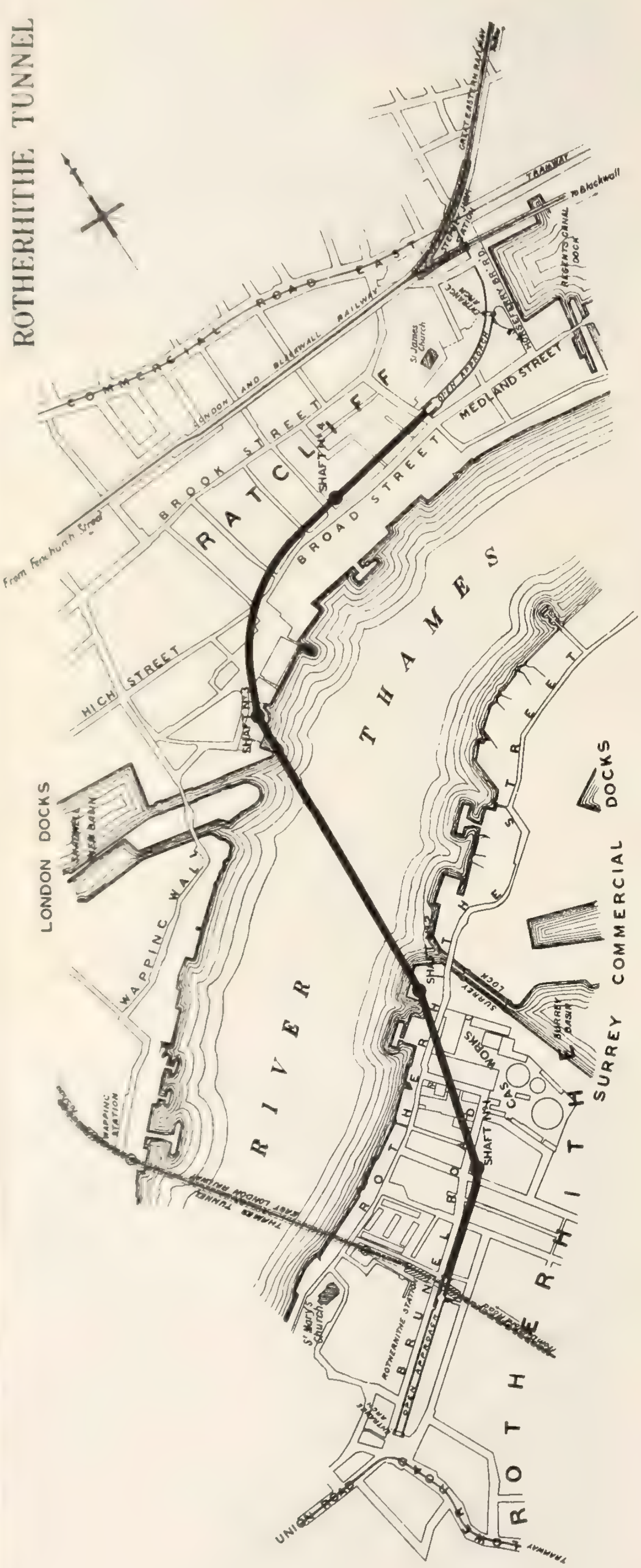
Two shields were used for the work, one for driving the tunnel under the river from the north to the south side and continuing for a considerable distance on the south bank of the river, the other for the remaining length of the tunnel on the north side of the river. The shields used were constructed of cast-steel and steel plates, and each weighed, complete, 380 tons. The shields were shoved forward by means of forty hydraulic rams fixed on the back of the shields, and abutting against the last ring of cast-iron which had been erected. These hydraulic rams were constructed for a working pressure of three tons per square inch, and at this pressure the total force shoving the shield forward was about 6,000 tons. To supply the compressed air necessary a very large installation of air-compressing plant had to be put up, and there was always sufficient plant in reserve in case of a breakdown. The engine room contained six air-compressors capable of compressing 1,000,000

Bridge carrying open approach over East London Railway



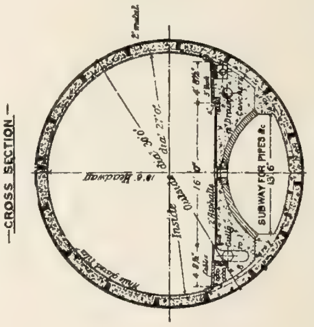
Shield entering shaft after crossing under the Thames

ROTHERHITHE TUNNEL

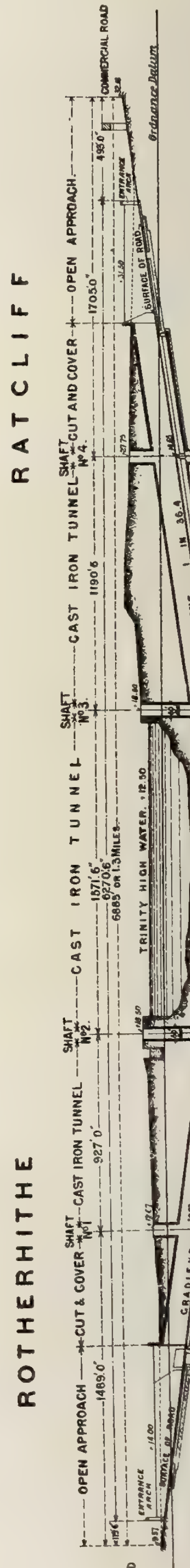


Maurice Fitzmaurice

—CROSS SECTION—



LONGITUDINAL SECTION



cubic feet of free air per hour to a pressure of 25 lbs. per square inch above the atmosphere.

For building the lining, two hydraulic erectors were used fixed to the back of the shield, which could pick up one of the cast-iron segments and place it in its correct position.

The roadway is 16 feet wide between the kerbs, which gives sufficient width for two lines of the heaviest cart traffic. The footways on each side have a width of 4 feet 8½ inches. The gradients on each side of the river are about 1 in 36. This gradient is not so steep as that in many streets in London, and is, in fact, about the same as that in the Haymarket. The paving of the roadway is of Aberdeen granite setts on the gradients, and of compressed asphalt two inches thick on the comparatively level portion under the river. A nine-inch brick arch supports the roadway, and the space between the arch and the bottom of the cast-iron lining forms a subway 13 feet 6 inches wide and 6 feet 11 inches high, in which can be carried water pipes, electric cables, or any pipes which may be required for ventilation. So far, no special provision has been made for ventilation as it was found that, at the Blackwell Tunnel, the natural ventilation from the shafts was sufficient. The interior face of the tunnel is lined with white glazed tiles, and there is a clear internal diameter of 27 feet. The lighting consists of three parallel rows of incandescent electric lamps spaced 30 feet apart in each row. Pumps electrically driven are provided in the shaft close to the river on the south side to deal with any leakage water and the water used in washing down the roadway every morning.

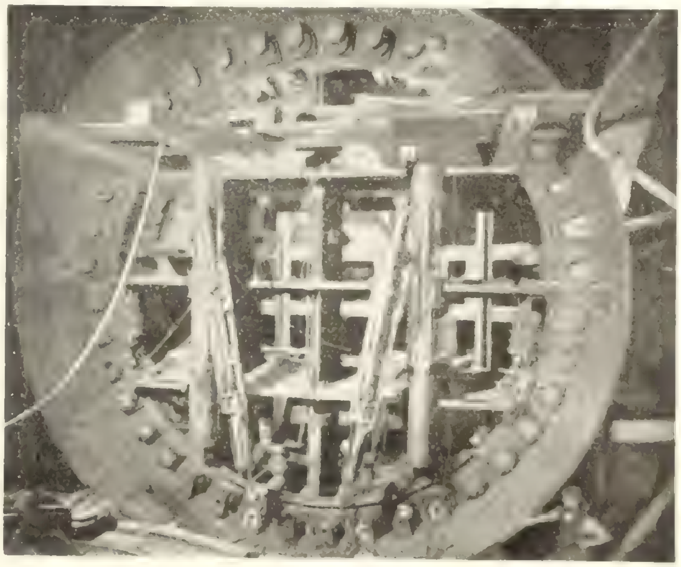
Sinking one of the caissons for shafts

In addition to the entrances at Lower Road, Rotherhithe, and Commercial Road, Stepney, provision is made for foot passengers entering the tunnel at about 1,000 feet nearer to the river than each of the above entrances, and also by means of staircases in the shafts close to each side of the river. There are thus six points at which access to the tunnel can be obtained by foot passengers, although, of course, cart traffic passes in only at the two main entrances.

As already mentioned, there is a considerable length of open approach on each side of the river before the actual tunnel is entered. It was therefore necessary to take some precautions to prevent carts with exceptionally high loads which would not pass through the tunnel, going down this open approach and then having to turn back when the tunnel was reached. For this purpose a gauge arch is erected at the top of the open approach on each side, which indicates the maximum height which can pass through the tunnel. This gauge arch was constructed of the cutting edges of the two shields used for building the tunnel, and is therefore, in addition to the purpose for which it is now erected, of considerable interest as forming a record of the way in which the work was carried out.

All the work under compressed air was carried on in three shifts of eight hours each. At one time there were eight hundred men engaged on the work, of whom about four hundred and fifty were working in compressed air. The London County Council had obtained Parliamentary power to compensate any men injured owing to working in compressed air, but on account of the care taken and the very large supply of air given per man, very little compressed air illness occurred. All the men were medically examined before being allowed to enter the compressed air ,and examination was also made periodically afterwards.

The contract time for the execution of the work was five and a half years, but the work has actually been completed in a little over four years. The contract price for the whole work was £1,088,484, this figure, of course, not including anything for the property required, the addition of the cost of this latter bringing the total sum up to about £2,000,000.



Back of shield

The tunnel was designed by, and has been constructed under the supervision of, Sir Maurice Fitzmaurice, C.M.G., the Council's chief engineer. Mr. E. H. Tabor was resident engineer. The contractors were Messrs. Price and Reeves, of Westminster.

Mr. John Callaghan, of Winnipeg, Man., has been appointed Chief Engineer of the Pacific Great Eastern Railway. The head offices of the company are at Victoria, B.C.

Mr. O. F. Falls, Building Inspector, reports excellent building prospects at Regina. Owing to the cold, backward spring very little has been accomplished yet. Plans for many important buildings are in preparation, however, and applications for permits are being filed rapidly.

Use of Concrete in Canal Construction

The Experience Gained on Lachine Canal Construction—Methods Employed on the Various Portions of the Work

Specially Contributed by Lt.-Col. Lordly, C. E., Engineer-in-Charge of the Lachine Canal

MAHAN, in one of the editions of his "Civil Engineering," says, "The Canals of Canada, in all respects, are the largest in the world." This statement is not true to-day, if the dimensions of any individual canal are taken only into account, but when all the engineering features are considered, it must be admitted that the chief canals of Canada, including the St. Lawrence system, still stand as the best examples of high class canal engineering, particularly where severe climatic conditions have to be contended with. The Panama canal is in a particular class by itself.

Popular writers, in the daily press, frequently attempt to compare our 14-foot waterways, so called, with those ship canals of Europe, forgetting that the latter have no locks, except for tidal purposes, and that there have been no engineering features in their construction worthy of special comment. Some of these canals are simply enlarged channels running from an outer to an interior port, the latter being the shipping point.

On the other hand, the word canal, with us, is almost synonymous with an uplifting, an overcoming of elevation between two bodies of water as well as a connecting link with the same. This has necessitated the construction of strong and massive locks and walls, supply channels and wasteways, and systems of unwatering certain portions of the canals for repairs or other purposes. These are not found in ordinary ship canals, but at the same time we must reflect that any canal, such as the St. Lawrence or Quebec canals, that has locks capable of passing vessels, loaded to a 14-foot draught and carrying eighty thousand bushels of grain, cannot be classed as a mere barge or towing canal. As a foreign engineer, while watching one of these vessels being locked into the Lachine canal, said to the writer, "Surely this canal is a ship canal."

The construction of these Canadian canals has been progressive. The rebuilding of the older canals, particularly the St. Lawrence system, is generally spoken of as "enlargements." All of the first enlargement and the major portion of the second enlargement, the latter having the 270-foot locks, might be properly termed the "Stone Age" of the canals, and the new work, or reconstruction, say from 1900 up, might be classed as the "Concrete Age." The latter will be dealt with mostly in this paper and is the real purport of the article.

The work done on our canals, under the "Stone Age," was designed and carried out by engineers who, besides having a grasp of the technical knowledge available in their time, possessed an abundance of practical knowledge, won in the hard school of experience, which enabled them to meet the variety of conditions under which the work had to be done, in a manner that meant success.

Lock foundations built on treacherous quicksands; dams and guard piers constructed in heavy currents and subjected to the forces of heavy freshets and ice jams each succeeding year, have lasted upwards of half a century to be replaced by, presumably, a more enduring and lasting material, viz.; concrete.

It has been the fortunate lot of the writer to have acted as Engineer-in-Charge of the reconstruction of a great part of an important link in the Canadian Canal System, viz., the Lachine Canal. This work has included the reconstruction and enlarging of two of the deepest locks; the laying of concrete lock bottoms in place of timber; the placing of concrete cutoffs to protect both upper and lower sills; the construction of heavy vertical concrete walls, bridge piers, and guard piers; the underpinning of old masonry walls and the construction of concrete waste weirs, all of which has been done in the dry by the aid of cofferdams, &c. In addition, there has been the construction of over five miles of concrete slope walls, done by a subaqueous process, and the construction of one large dam also done by the same method.

This work has been carried on progressively for ten years at an expenditure of over two and a half

1—Old stone lock, Lachine Canal; recess wall and section of old wall

2—Concrete extension on old lock, with three courses of ashlar rubbing face million dollars. Not the least valuable of all the experience gained has been the knowledge derived from the tearing down of the old "Stone Age" constructions to make room for the new. Some of the old work removed was built more than forty years before. Masonry foundations, laid on timber platforms, were found in a sound state of preservation. In some places the foundations were over a species of silt, kept dry by oak sheet piling and clay puddle. The lock breast walls were composed of heavy stonework laid in a blue lime concrete, or mortar, and bound together by long wrought iron dowels in a manner that almost defied dynamite. In some places the work was found so strong that it seemed a sin even to attempt to destroy it. Oak timbers more than eighteen inches square and thirty to forty feet long, and planks two feet wide, held together by square drift bolts and hand-made spikes, could only be removed by the most tedious means of sawing and cutting. Could any of those who originally built this work have been present during its removal they would have been amply repaid for all their early labors and worry by hearing the "picturesque" remarks of the laborers who strove, hour after hour, in their endeavors to destroy it.

3—Concrete plant; working from high to low level; X is crusher

In order to expose much of this work, particularly the locks, and to reconstruct it in the dry, a number of cofferdams, built under a variety of conditions, were required, as navigation was maintained in the canal. At the entrance to Lock No. 1, a heavy timber and clay cofferdam was constructed to keep the water back from the River St. Lawrence. The underpinning of heavy walls could only be done in the month of April, during the annual unwatering of the canal, but the subaqueous work was carried on during the favorable portions of the navigation season.

When planning for the reconstruction of the lower locks of the Lachine canal, in 1902, the question arose whether the locks should be constructed entirely of concrete or with only a backing of concrete and an ashlar stone facing. At this time there were no all-concrete locks in existence that were being operated under the severe conditions, both traffic and climatic, that would prevail on the Lachine canal. It was anticipated that the heavy traffic through these locks would soon wear the face of the walls, from the low water mark up, if built of concrete, and also that the coping and edge, or nozing, of the same might be destroyed by the shocks from the steamers.

On the other hand, the old stone masonry entrance to the locks, built more than forty years previously, were found to be in a wonderful state of preservation. The stone lock walls were badly worn and broken in places (see Plate 1), but this was due largely to the fact that some of the courses had been forced forward by the action of the frost, thus presenting an uneven face to receive the rubbing of the boats.

As will be seen also in Plate 1, the recess wall behind the gate was in a perfect condition, but this same state should also occur if concrete, of the present day quality had been used. The edge of the recess unless protected by steel, would not have stood the abrasion of the boats. Had the back of the walls been built of a good impervious concrete instead of a species of blue lime mortar, or a weak hydraulic cement concrete, which permitted the water to work in between the courses, and eventually freeze, the facing of ashlar would not have been heaved out by the action of the frost. In fact it was found that the courses extending down about six feet below the coping were only held in place by the 2-inch iron dowels that extended from one course into the third course below. This was a point in favor of a concrete backing and concrete counterforts.

The decision arrived at, therefore, was that from the low water line up to the coping, 17 feet, the lock walls would be faced with limestone ashlar masonry backed with concrete walls and counterforts, and that from this level down, also 17 feet, an all-concrete wall would be used in the extension of the lock. The work was carried out on these lines. Plate 2 shows the concrete extension, all below the low water line, with three courses of the new masonry rubbing face. The wisdom, or otherwise, of carrying out this plan of construction of the lock walls will be noted in the conclusion of this article.

Layout of the Concrete Plant

The method of carrying out the concrete mixing and handling on the above work will stand as an example of a most economical layout and possibly one that might often be repeated elsewhere.

4—Concrete hollow quoin for 15 foot gate for small dry dock

The plant was a combined crushing and mixing one and about the first of its kind that had been used in this part of the country. The principle was that of working from a high to a low level, which is often possible in canal work. The crusher platform was placed slightly above the level of the coping of the upper lock, a storage bin being placed below the crusher and right over the mixer. The total vertical distance from the crusher platform to the level of the tracks below the mixer was 36 feet. The concrete was carried in one-yard steel cars, transported on rails and pulled by horses. This one plant supplied all portions of the work within a radius of five hundred feet, a second plant being used for the lower lock and spur walls. The latter plant was without the crusher. Plate 3 gives a good idea of the high lay-out and is worth studying.

If the difference of elevation does not permit of a storage bin being placed so that it can be filled from the crusher by gravity, a chain bucket elevator system may be employed at a slight additional cost. Experience has since shown that the cost of the concrete per yard, with the system above described, was lower than that made under any other lay-out. This study of a proper lay-out is most essential in any type of concrete work and is something that must be given great attention by young engineers and contractors.

Concrete in Lock Gate Recesses and Hollow Quoins

In the reconstruction of the locks, the gate recesses and hollow quoins were faced with cut stone, the blocks containing the hollow quoins being especially large in order to get a secure bond with the concrete backing. A concrete hollow quoin, reinforced, of course, and with a plate or steel casting for the wearing surface, is possible in lock construction, but there is still much preference for stone quoins. The author has built a concrete hollow quoin, reinforced, and faced with a steel plate forming the quoin, but this was for only a shallow gate, 15 feet, whereas for a deeper gate and in a lock where there was much traffic, a heavy steel casting in the quoin would be necessary.

5—Interlocking steel pile and concrete cut-off at heel of lock

The wear on the quoins is due mainly to the action of the water rushing through, if the gate does not fit tight, and to debris getting jammed in during the operating of the gates. When the stone quoins were removed in the old locks it was found that those down close to the bottom were quite honeycombed and water-worn. Only in some few places were there any corners broken off near the contact point with the gate. Steel quoin castings, set in stone, are now in use on the lower recess of Lock No. 1 on the Lachine canal, and the result has been satisfactory and it would be equally satisfactory had the surrounding body been concrete instead of stone, but with an all-concrete hollow quoin there would be a strong element of doubt as to the final result.

In the gate-recesses the use of concrete will be found satisfactory in the wall behind the gates as the latter forms a protection, but the angle or corner of the recess, in line with the main wall, must be protected by an iron, or steel plate, otherwise it may be badly broken. While this would have no detrimental effect in the use of the lock, it would certainly make it appear unsightly. Plate 4 shows a concrete hollow quoin, 15 feet deep, lined with a steel plate. This was built by the author, in a small dry dock.

Concrete Lock Bottoms and Floors

The lock bottom, recess platform, or floor, and the sill platform and foundation, are ideal places for the use of concrete, both in economy and efficiency, compared with the old slab stone bottom of former days, or the oak timber platforms sometimes used. In many of the old locks, leaks developed under the recess or sill platforms, the water working in from the lowest point of the invert of the lock bottom. In some cases where a deep cut-off had not been sunk below the junction of the bottom proper and the platform, the water worked its way under the platform and sill for the gates. This was found to be the case in one of the old locks on the Lachine canal. Here, again, concrete proved to be a master. By its use a monolithic lock bottom, breast wall and sill platform combined, was constructed, which, with concrete walls built as high as the breast wall for the upper gates, constituted a structure, not unlike the hull of a ship, that should be free from leaks for all time.

Lock Bottom on Quicksand

It may happen that a lock, or portion of it, has to be built on a site where quicksand, running silt, combined with boiling springs, is encountered. Oldtime lockbuilders attempted, and with success, to meet these conditions by the use of piles, oak sheeting and puddle clay, with a double oak flooring, laid on heavy cross timbers, over this again, forming the bottom of the lock. Cut-offs were placed at both upper and lower ends of the lock and also along the sides or back of the walls. This was what was found in the lower lock of the Lachine canal, and the removal of the old work showed how efficient the method had been. At the upper end the cut-off was not deep

6—Old masonry canal basin wall requiring to be underpinned enough and the springs had washed out some of the under-bed of the floor. The bottom was timber and when the floor was removed the lock presented the appearance of a wooden hull resting on sand with a low fence built all around it.

In repairing or rebuilding this work, the first thing that was done was to collect all the boiling springs to run into one large pipe. This pipe was brought up through the bottom of the lock and left unthrottled. Interlocking steel sheet piles were driven along the sides and across the lock, above and below the breast wall. In some places these piles were 21 feet below the breast wall—upper gate floor—or about ten feet below the actual bottom of the lock. Where this cut-off joined with the side walls the latter were removed, foundation and all, and the row of piles continued through to a safe point beyond the back of the walls. Plate 5 gives a view of the work showing a section of the concrete top wall finished. The piles in the bottom were afterwards covered with concrete which joined with the breast wall and made a complete watertight connection.

7—Canal basin wall underpinned and faced with concrete

The concrete for this work was made as impervious as possible and where it was laid to a depth of three feet or over, large flat stones were used as displacers. Some of these stones were four by six feet on the surface and eighteen inches thick and were placed low down in the concrete so that if any water did soak in there would be nothing to erode away.

Concrete Underpinning of Masonry Canal Walls

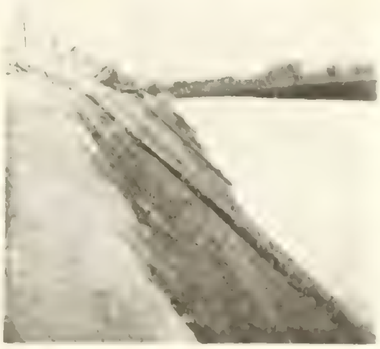
As the deepening process is carried on in the older canals the underpinning of the masonry walls will become necessary.

On the Lachine canal this class of work was one of the first undertakings in which concrete was employed. Many of the old masonry walls had become partially undermined by the action of the dredging and before the work of deepening the basins could be continued it was found necessary to make the walls safe by underpinning. It was decided to carry the new foundations down to at least 20 feet, from normal water line, in order to get a firm footing and also to place the safety of the walls beyond doubt should it be decided to deepen the canal even to such a depth as 20 feet. The work was carried on during the month of the annual unwatering, generally all of April, at first by doing a small section for several seasons under the supervision of the Canal Engineer and latterly by letting contracts on a larger scale for the completion of the whole. About one mile of wall was underpinned

Plate 6 shows a wall in a basin of the canal which requires to be underpinned and Plate 7 a finished wall with a new concrete facing, placed on top of the underpinning, and in front of the old wall. The method of doing the work was simple, but on account of the heavy buildings close to some of the walls, extreme care in carrying it out was necessary. The face of the wall was marked off in sections of about 8 feet. Each alternate section was then excavated down to a firm footing, about 9 feet, with a space of 4 feet in front, if the wall was to be refaced, and a depth under the wall of 4 feet. As the work of excavation proceeded, posts and corbels were placed under the old masonry to keep the wall in position. The front and sides of the excavated space were then sheeted with 2-inch planks, and concrete, made very wet, was dropped in from the top of the wall above and rammed well under the walls. In about three or four days this concrete was hard enough to allow of the intermediate sections being excavated and these were sheeted in front also and the concrete filled in, as in the other spaces. All this work, except the concrete mixing, had to be done by hand and the great amount of shoring necessary in some places made progress exceedingly slow.

The concrete was made in the proportions of about 1-3-6 and the mixture was of a consistency that would cause the concrete to quake-move in a mass—when each successive batch was thrown in. Displacers of one man stone were placed in the concrete and this helped to cheapen the work and to facilitate its progress. All of the timber shoring was left in; also the face mold planks, the latter in order to protect the wall from the dredge.

The cost of the concrete, done under the above conditions, and where there is but a narrow space to work on overhead, will be at least twenty per cent. more than concrete placed in ordinary work. The excavation also will be more expensive than digging an ordinary trench, in the same class of material, as delays will be caused by the shoring and the small space under the wall only allows one man to pick at a time. Therefore, in estimating the cost of this kind of concrete work, liberal allowance must be made for the peculiar conditions under which it must be done



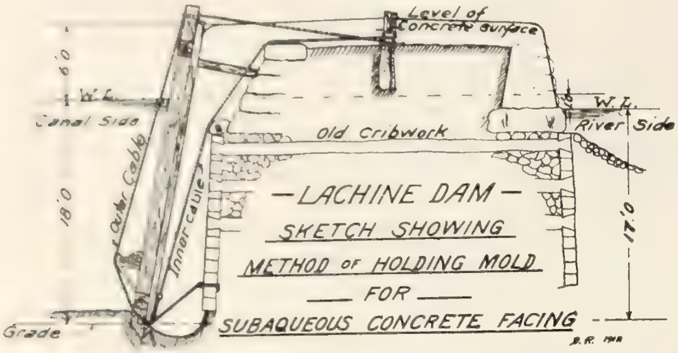
8—Side view of subaqueous concrete wall, unwatered

Concrete Basin Walls

Plates 11 and 12 show types of heavy concrete walls in canal work which have some points of interest.

The wall in Plate 11 has a depth of about 20 feet, with a base of 9 feet and a coping of 4 feet. As the wall was to stand for some months after being built, before traffic would be brought against it, the usual steel nosing was omitted. However, any concrete canal or wharf wall, which is likely to be used immediately after construction by even very small vessels, should be protected by a steel nosing of 3/8 plate, 14 inches wide and bent to a radius of 3 inches. This plate is held in place by 1-inch anchor bolts with upset heads and countersunk into the plate.

As a clear space is needed on the coping, the mooring posts are placed back of the line of wall. This is best done by constructing counterforts to form a part of the wall but not necessarily running down to the bottom (see Plate 11). For ordinary work a 200-lb. niggerhead held in place by a 2-inch wrought iron spindle, 3 feet long, will be sufficient. For mooring near locks, and in a current, a larger post, with four spindles, is better.



9—Sectional sketch of dam at entrance to Lachine Canal

If the concrete wall is built in the dry and the space in front is afterwards to be dredged, it will be necessary to protect the lower face of the wall from the dredge bucket. This may be done by forming the lower part of the front mold of 2-inch sheeting and attaching it to the wall by anchor bolts and a longitudinal stringer. The sheeting remains in place when the top section of the mold is removed. Plate 12 shows a wall finished in this manner, the photo having been taken just previous to the dredging operations. The wisdom of taking this precaution was amply seen during the progress of the dredging.

10—Subaqueous concrete work on dam. View of plant. Getting canvas ready

Concrete Wasteway

Concrete is invaluable in doing rush work during the annual period of unwatering which is necessary on Canadian canals and many important improvements must be done at that time. Plate 13 shows a view of a wasteway wall which was built during the month of April during unwatering. This, of course, means day and night work. An unusual feature here is that the top of the wall is used as a sidewalk and the iron railing is placed in saddles sunk into the wall in order to gain room.

An important point to be noted in building a wasteway wall, or any concrete wall, where there is to be a violent rush of water against it, is to ensure that a smooth face is made to the wall at the first operation. A rough wall, afterwards plastered, will eventually scale or peel off. The smoothness must be in the wall itself. This may be attained by the use of a pronged fork to work the stone from the face of the wall and by the addition of a few batches of a richer concrete than the ordinary mix. As a rule any wall found with a poor and unsightly face is apt to have other defects, poor alignment, &c., as, except in rare cases, it is a proof of careless or ignorant work. The top of the coping should also be finished at the time the main wall is laid, otherwise it will scale or work off in layers after one season of frost. These points have all been learned by experience.

Subaqueous Concrete Work

This is the name given to that class of concrete work which is done by depositing the concrete directly into place under water. It is necessary on work where there is no possibility of constructing cofferdams to unwater the site. In canals where navigation must be maintained while repairs, enlargements or new construction must be carried out, the subaqueous method of carrying out concrete work is a most valuable aid to engineering.

On the Lachine canal more than five miles of concrete slope and vertical walls have been laid by this method under the supervision of the author. The system consisted mainly in having molds large, tight and strong enough to hold the concrete in position, and an adequate plant for handling the material.

What would probably be of the most interest here is a description of the quality of the work done, as those not experienced in this class of concrete work cannot be blamed for being somewhat sceptical of the result. Plate 8 shows a side view of a section of a slope wall laid under water but unwatered for inspection. This piece of wall has withstood the action of a severe winter and the effect of a heavy body of ice sliding slowly down its face, with a grinding action, as the water was drawn off of the canal in the early part of April. This particular piece of wall shows the lapping of the molds, as it was the beginning of a curve, but as may be seen the wall is quite smooth and regular. While the surface of the concrete, in this kind of work, may not always turn out smooth and uniform, as in ordinary concrete walls done in the dry, repeated yearly examinations have proved that for endurance and hardness the subaqueous concrete cannot be surpassed. The absence of cracks has been most noticeable, as practically no expansion joints were provided.

The main points to be watched are first-class materials, good cement—quick setting—and proper care in placing the concrete in the water. This latter is accomplished by beginning at one end and working forward so that the concrete mass will always slide by its own weight, thus moving forward slowly and causing no voids.

Subaqueous concrete work need not be confined solely to locations where the water is absolutely still or where only slight currents exist. With special precautions concrete may be laid in fairly swift-running water.

Subaqueous Concrete Dam

Plate 9 shows a sectional sketch of a dam at the entrance of the Lachine canal which was built by the above process during the season of navigation, in 1911. At the time of doing the work there was a head against the upper side of the dam of about one foot and accompanied by heavy waves during windy weather. This dam was originally a crib and stone structure which had been badly damaged by the action of the ice and freshet of previous years, thus causing heavy leaks through it. The object of the dam is to form an entrance into the upper end of the canal and to prevent vessels from being swept into the swift current of the River St. Lawrence. The sketch shows the method of holding in place, the big timber molds, behind which the concrete was to be deposited, and secured to the cribwork of the dam.

The one hundred foot molds, formerly made for the work on the canal slope walls, were used but were secured in a different manner than before as the facing of the dam is almost vertical. The slope walls were 1 to 1, and it was quite easy to keep the molds from sliding. In this case the footing for the mold was also poor as the toe of the dam had been clammed out to form a trench for the new foundation.. This meant a different method than before of holding up the molds in position and providing means to keep them in place at the bottom.

11 Canal basin wall, 3 000 ft. long, with concrete counterforts forming part of the wall

12—A canal basin wall showing sheeting in place to protect wall from dredge

Five steel cables were used with each mold, three of 5/8 inch and two of 7/8 inch. The former were attached to the inside bottom of the mold and sufficient tension was put on when tied to the top of the dam to make the cable tight. The other two cables were first fixed by the divers to the bottom of the crib, about 3 feet up, and carried out under the mold and then up over the outer face, twisted around a timber at the top of the mold and then secured to a post fixed on the dam. These cables were got ready and laid on the bottom before the molds were lowered into place. Without these latter cables the weight of the concrete mass behind the mold would cause it to swing outward on the hinge formed by the three inner cables. The inner cables were only to carry the weight of the mold and to keep it from settling down. A bulkhead of plank was then placed at the ends of the mold, and at intermediate points, depending on the current, thus confining the water and stopping the eddies. The greatest difficulty appeared in preventing the water from rushing through the loose crib and stonework of the old dam. This was overcome by placing large sheets of canvass against the face of the old crib and securing it well down at the bottom. Once in place the water held it in position and a few batches of concrete at the bottom soon overcame any leakage. Plate 10 is a photo of the men getting the canvass ready to lower into place and also gives a good view of the complete mixing plant used for the work. The entire length of concrete facing done in this manner was exactly one half mile and every leak in the dam was successfully stopped. The wave action due to the winds, and passing steamers, which came close to the dam, caused some trouble in operating the plant at times, but the steel cables prevented the molds from moving. The success of this kind of work depends largely on the precautions to firmly secure the molds in position and to keep them watertight.

The concrete is usually best filled in behind the molds, under the conditions of this work, by filling about one-third the depth first, moving from end to end of the mold while filling, and completing the section after this has set. If the molds are filled immediately to the top a slide is apt to occur.

A concrete consisting of good coarse sand and run of crusher stone, mixed a little better than 1-3-6, proves suitable for ordinary work, but if there is

13 Wasteway wall built in 30 days from time of starting excavation

much agitation behind the molds, and some leakage, it will be necessary to add at least one bag of cement more, per each yard placed. The molds were generally removed on the fifth day after the concrete had been placed behind them. With some slight exceptions the face of the wall was even better than is ordinarily seen in work done in the dry. The dam above described when finished completely will have both the sides and the top faced with concrete and the nose of the coping protected by a 14 x 3/8-inch steel plate. The outer end, or ice breaker, is completely protected by a steel plate covering.

Summary

This article has outlined the general use of concrete in canal construction.

The experience gained has proved that the decision to go slowly at the start in substituting concrete for stone on the Lachine Canal was well founded, as canal walls and locks are subjected to harder usage than ordinary retaining walls or abutments and a variety of conditions must be considered. We know now, also, that sharp corners, the edge of copings, &c., unless away from the line of heavy traffic, should always be protected by iron or steel plate. Curved end walls, bridge abutments and guard piers, are best formed by a curved iron or steel plate which should be anchored to the wall if a protecting surface is required. The cost of using this plate is but little more than constructing a wooden curved mold. In the latter case the expense is mostly for labor, whereas the curving of the metal plate is done by machinery and at a small cost.

Care and good judgment must be adhered to at all times in the selection and use of concrete materials. Volumes should be measured exactly and not guessed. The cement should be tested with the sand that is to be used in the work and under exactly the same temperature conditions, both in air and water. Slow setting cements should not be used for early Spring work if traffic is to be permitted to use the new structure before it has had the effect of at least one month of warm weather. The use of displacers should be permitted whenever possible, as this is a saving of cement and, as a rule, provides stronger work.

Concrete laid in cold weather, even below zero, is possible if sufficient precautions are taken. It must be remembered though that is always costs more and that surfaces are not likely to be as good as when the work is done under normal conditions.

Trained inspectors should be employed at the mixers and at the site of depositing the concrete. An inspector who has had at least one winter's experience in the cement laboratory is usually the best, as he has learned the necessity of good materials and careful work. The mixer foreman, the concrete inspector, or any employee directly responsible, who claims that he "knows all about concrete" is a dangerous man on important work. Familiarity breeds contempt and induces carelessness. The latter is the greatest enemy to successful concrete construction.

The work above described has been designed and carried out by the author for the Department of Railways and Canals under the direct supervision of Mr. Ernest Marceau, Superintending Engineer of the Quebec Canal System and a Past President of the Canadian Society of Civil Engineers. Mr. Marceau is a canal engineer of long and varied experience, and much of the success attained in using concrete in the work dealt with in this paper is due to his advice and co-operation. To him, also, credit is largely due for the undertaking of laying the subaqueous slope walls on the Lachine Canal.

A careful and capable staff has also assisted in watching the many details that must be kept track of in concrete construction. This staff consisted of Mr. G. L. Viger, Assistant Engineer; Messrs. N. Lacroix and D. Renaud, Junior Assistants, and Messrs. A. R. Roy, J. Fournier, C. Shanahan and J. Yorgan, Concrete Inspectors, the latter being in charge of the cement laboratory which is well equipped and has records extending up to ten years.

The contractors for the subaqueous work were Messrs. Haney, Quinlan & Robertson, Montreal.

Sewerage System of the Peterborough, Ont., Manufacturing District

Of the works undertaken in Peterborough, Ont., last season, the most important was the drainage of the southwest or manufacturing district. This being low-lying and level land, it entailed the installation of a pumping station at a central point where the sewers were collected. The 18-inch sanitary sewer on George Street meets the 12-inch Romaine Street sewer after passing under Grand Trunk Railway tracks at man-hole in front of pumping station, and both are then led into the well in building through a 15-inch pipe. From the well it passes into ejectors situated on the lower floor of the station and these by air pressure force the sewage through a 12-inch cast iron main to the 15-inch sanitary sewer on Romaine Street, east of the G. T. R. track. The sewage is then carried by trunk sewer to the river. To provide against flooding of residences connected to the sewer through failure of power to run air compressors, the old 9-inch pipe under the G. T. R. track is used as an overflow to connect the eastern section with the western section of the Romaine Street sewer.

To take care of the storm-water and surface drainage, a 20-inch concrete storm drain is constructed on the south side of Romaine Street, running from Park Street to the Little Lake where an outlet is provided at the corner of Romaine and Crescent Streets.

The pumping station is equipped with two 7 h.p. motor-driven air compressors, direct connected, furnished by the Lancashire Dynamo and Motor Company, of Manchester, England. Each unit has a capacity of 50 cubic feet of air per minute. There is also an auxiliary gasoline air compressor (110 cu. ft. per minute) supplied by the Canadian Fairbanks Company, of Toronto. All these units are connected to two large air receivers and from these the compressed air is led to the ejectors. Each air unit is supplied with relief valves which automatically shut off the compressor when 15 lbs. or more pressure is registered on the gauge, and turn it on again when the pressure falls below this point. For present needs one ejector and one air compressor unit are required to be in continuous operation. The gasoline unit is to be used only as an auxiliary in case the electric power fails. As a precautionary measure a private alarm system is installed.

Of the routine work carried out by the City Engineer, Mr. T. A. S. Hay, there are three and a quarter miles of concrete walks, making a total now in use of 55 miles; 1¼ miles of sewer, making a total of 27 2/3 miles; two sections of surface drains and 19 catch basins; 25 concrete pipe drains and culverts of from 8-in. to 36-in. diameter.

Laying 78-in. Reinforced Concrete Pipe in Difficult Ground

Contributed by A. F. Macallum, City Engineer, Hamilton, Ont.

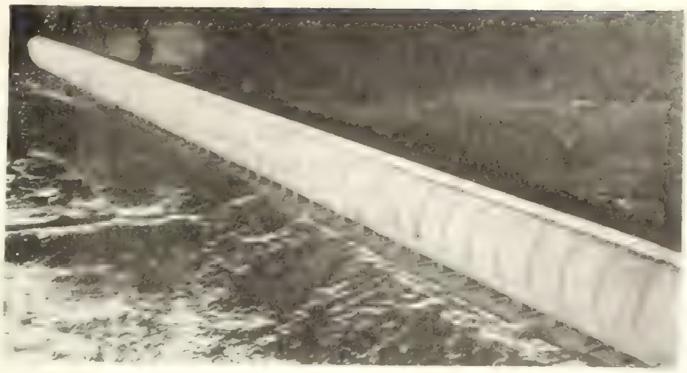
THE trunk sewer described herein was built through very broken ground in the west end of Hamilton from the Marsh known as Coote's Paradise, to and past the roundhouse of the Toronto, Hamilton & Buffalo Railway to connect there with three sewers coming from different directions.

The sewer was of reinforced concrete, 6½ ft. inside diameter, laid to a grade of 3/10, and similar to sewers of this nature in other cities. The contract price for this reinforced concrete pipe, made on the ground, was $7.22 per lineal foot. Along this pipe line of 2,500 ft. there was no place where the usual overhead methods of handling the pipe could be adopted, so that different methods had to be used at different points. Across low ground, as shown in one of these illustrations, piles were driven at 8 ft. centre and two abreast, on which were placed sills and stringers, and on these the pipe was locked up, as shown. The cost of these piles in place was 35c. per ft. The pipe on these trestles, of which there were two, was laid by means of a derrick, through the ridges, three in number, one of which is shown in the accompanying photograph. The pipe was drawn into place by means of block and tackle.

It had been the intention to tunnel the last 400 ft. of the pipe, which passed alongside and partially beneath the T. H. & B. Railway round house, but upon an examination of the ground it was found that it was unsuitable, so that a 30-ft. cut had to be made from the surface and heavily timbered on account of the adjoining buildings and the main line tracks of the T. H. & B. Railway. Upon entering into this deep cut it was decided to change from reinforced concrete pipe to a monolithic section, but this was again changed, for the reason that the concrete would not set up sufficiently fast to allow the back fill following closely behind, which was absolutely necessary here on account of the railway operations about this place. Paving brick was then used, laid in cement mortar, and carried along to a point, at date of writing, about 50 feet from the end.

Handling Reinforced Concrete Pipe with Derrick

The weight of each reinforced concrete pipe of 4 ft. lengths, was 8½ tons, and the cost of handling this pipe and placing it in position under these conditions was $1.60 per ft. The monolithic section of the sewer cost $9.00 per ft. and brick section $15.00 per foot, under the conditions existing.



Reinforced Concrete Pipe on Trestle

On account of the formation of the ground—most of it on steep hill sides—it has been impossible to use plant directly over the sewer trench. The accompanying photographs will illustrate the methods used.

Canadian Building Returns

The following are the building returns of the principal cities for the first quarter of 1912 with the amount for the corresponding period of 1911: Toronto, $3,665,830 and $3,638,940; Vancouver, $3,335,407 and $4,607,330; Winnipeg, $2,923,810 and $1,751,400; Victoria, $2,852,725 and $614,340; Calgary, $2,408,718 and $1,641,960; Montreal, $1,431,159 and $2,110,165; Edmonton, $1,198,222 and $399,055; Fort William, $989,450 and $35,325; Hamilton, $703,800 and $464,950; Regina, $429,480 and $622,225; Ottawa, $404,735 and $228,075; Port Arthur, $335,350 and $20,385; Maisonneuve, $323,000 and $318,000; Lethbridge, $298,770 and $208,750; Saskatoon, $281,065 and $87,767.

Timber for bridge floors is one of the subjects dealt with by Mr. Robert R. Evans, engineer of Essex County, Mass., in his annual report for 1911. The experience with Pennsylvania beech, which has been in use on the Groveland bridge over the Merrimac River for 2 years, indicates that it is a much more economical material than spruce for a wearing surface. At the Haverhill lower bridge the superiority of beech for a top floor also is being demonstrated, according to Mr. Evans. This floor has been down 1½ years and is reported to be in good condition. Traffic is very heavy and a spruce floor requires repairing in a very few months.

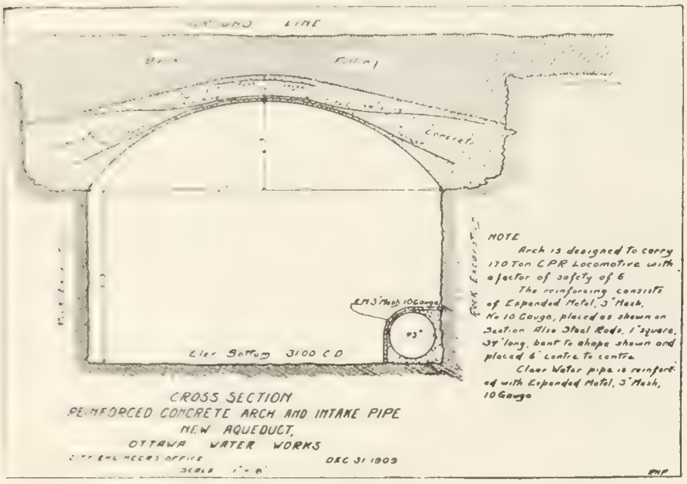
A buried longitudinal tie connecting two of the foundation piers of the viaduct approach to the main spans of the St. Croix River Bridge, on the Minneapolis, St. Paul & Sault Ste. Marie Railway, consists of twenty 1⅛-in. round bars enclosed in a mass of concrete 18 in. wide and 24 in. deep, reaching from pier to pier about 4 ft. below the surface of the ground. The rods are in five lengths, varying from 42 to 50 ft., and are turned up at right angles at both ends, thus securing independent grips in the concrete of the piers. The piers are thus connected by a non-obstructing member, which can develop some compressive strength and considerable tensile strength, and tends to distribute between both piers any longitudinal stress on one of them, which is seated near the top of a steep bank.

Municipal Work at the Federal Capital

Reinforced Concrete Bridge to be erected over the Rideau Canal on Bank Street—New Aqueduct and Intake Pipe

Specially Contributed by N. J. Ker, City Engineer of Ottawa, Ont.

At present, Bank street traffic is carried over the Rideau Canal on a steel swing bridge with a twenty-foot roadway. This is too small to accommodate the traffic and will not permit the Electric Railway to extend its tracks to the rapidly growing part of the city south of the canal. A new bridge was needed, preferably a high level one, that would permit uninterrupted traffic on both the canal and the street. The new bridge has been designed to meet both these requirements, having in the main channel a clearance of twenty-nine feet above water level. The cost of the bridge will be defrayed by both the Dominion Government and the city, the former contributing $80,000 and the latter $50,000.


GROUND LINE
Filling
Concrete
E.M. 3" Mesh 10 Gauge
43"
Elev Bottom 3100 C.D.
Rock Excavation
NOTE
Arch is designed to carry 170 Ton CPR Locomotive with a factor of safety of 6
The reinforcing consists of Expanded Metal, 3" Mesh, No 10 Gauge, placed as shown on Section. Also Steel Rods, 1" square, 34' long, bent to shape shown and placed 6" centre to centre.
Clear Water pipe is reinforced with Expanded Metal, 3" Mesh, 10 Gauge
CROSS SECTION
REINFORCED CONCRETE ARCH AND INTAKE PIPE
NEW AQUEDUCT,
OTTAWA WATER WORKS
City Engineers Office
DEC 31 1909
Scale 1" = 8'

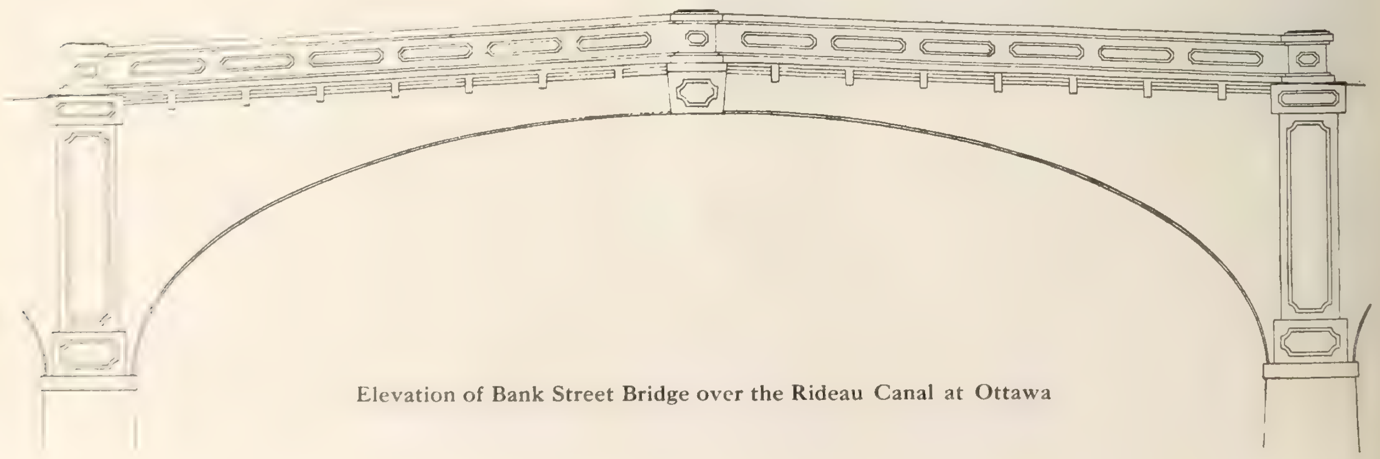
The main channel is spanned by a seventy-six foot arch with a rise of 17.5 feet. The south approach consists of one arch, span 62 ft., rise 14 ft., one arch, span 50 ft., rise 11.15 ft., and about 30 feet of retaining wall which completes the approach to the north side of Echo Drive. The north approach consists of three arches with spans 62 feet, 50 feet and 40 feet, and rises of 14 feet, 11.15 feet and 8.7 feet respectively, and 230 feet of retaining wall.

The Ottawa Improvement Commission Driveway will be carried under the approach arches, through the Exhibition Grounds and along the north bank of the canal as at present. The grade of the roadway on both approaches is five feet per 100. All arches have been designed with elliptical intrados and circular extrados and are proportioned to conform to the specifications of the Department of Railways and Canals. The arch rings are reinforced both top and bottom with steel bars tied together both vertically and horizontally, the percentage of steel at the crown being 72 per cent. The roadway has a clear width of 40 feet and will be paved with creosoted wood blocks. Two eight-foot sidewalks will accommodate the pedestrian traffic, and conduits for the several electrical companies will be provided beneath the walks. The balustrade will be built of reinforced concrete, the posts carrying combination lamp posts and trolley poles. The total length of the structure is 630 ft. The total estimated cost of the bridge, including land damages, is $130,000. The contract for the construction was awarded to Messrs. Jones & Girouard, Ottawa, at $99,500.

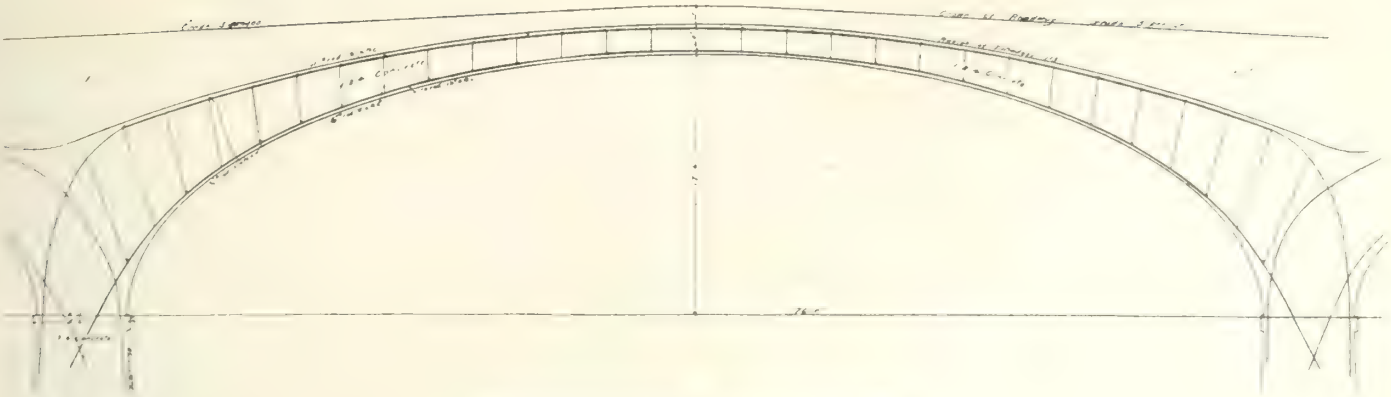
New Aqueduct and Intake Pipe

The waterworks pumping plant at Ottawa is operated by water power. The water is taken from the Ottawa River above the Chaudiere Falls and is conveyed at present by an uncovered aqueduct through a rock cutting. The head varies from 23 feet to 30 feet, depending upon the season of the year, the least head being obtainable in May when the north or flood water backs up in the tail-race below the Falls.

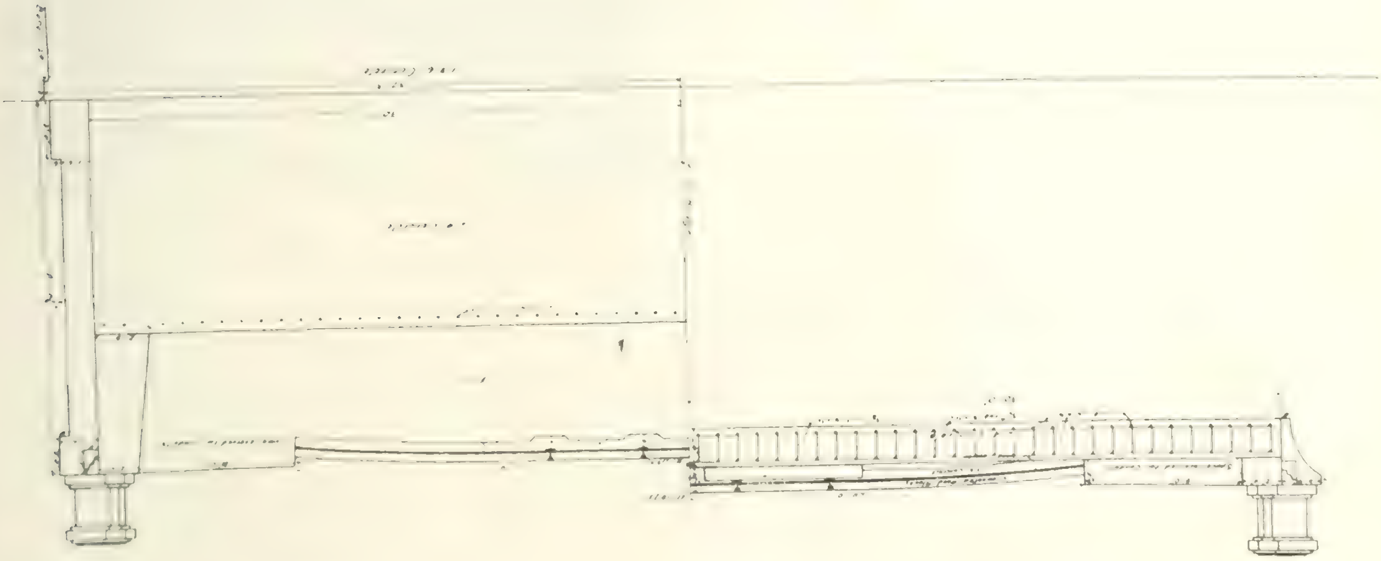
The new aqueduct draws the water from the same point in the river, but for various reasons a different route was followed between the river and the pumping station. It is also through a rock cut, but covered, the cutting being one-half mile in length, 27 feet wide and 22 feet in depth. It passes under the Canadian Pacific Railway freight yard, where the numerous tracks and switches are upheld by a reinforced concrete arch, as shown on the accompanying cross section. Traffic was maintained at all times and no one was injured, although the work passed directly



Elevation of Bank Street Bridge over the Rideau Canal at Ottawa



Longitudinal Section, Bank Street Bridge



Section at Crown

Section at Pier

New aqueduct passing under C. P. R. tracks

New aqueduct and intake pipe—Ottawa river section under the point of one of the principal switches. The local storehouse of the Massey-Harris Company was also underpinned and successfully negotiated without injury. From this point the aqueduct passes down the centre of Ottawa street, which is in a thickly populated district. Sewers and water mains were taken up and replaced on each side of the street, while the roadway is supported by a concrete arch without reinforcing.

Water for consumption is obtained from the Ottawa River above the city and Chaudiere Falls, and is conveyed to the pumps by a 40-inch steel intake pipe. The new pipe under construction is to supplement the old one and enable necessary repairs to be made.

For 2,050 lineal feet a new 43-inch reinforced concrete clear water pipe is built in the bottom of the aqueduct as shown. The balance of the pipe is 42-inch steel, 3/8-inch metal, and connected by iron flanges ½-in. x 4-in. x 4-in. with lead gasket and 7/8-inch bolts. The river section of the pipe, 3,350 feet in length, is nearly all laid in a rock trench in the river bed, 8 feet in depth, excavated after drilling by a dipper dredge built especially for the purpose by the Engineering Department at a cost of $3,325 complete. This dredge worked very satisfactorily.

The present population of the city is given as 90,450, while the average daily consumption of water is 15,642,000 gallons. In cases of fire this may be increased at any moment to a rate of 20 million gallons per day. The system is direct pressure without a reservoir.

In the recently annexed suburbs of Ottawa East and Hintonburg there are two small auxiliary stations available, one being operated by electricity, the other by steam, the combined capacity being 3,000,000 gallons per day.

The present intake will deliver, safely, 15,274,000 gallons per day under adverse (i.e., low water) conditions. The new intake pipe will deliver under adverse conditions 18,093,780 gallons per day, a combined safe capacity of 33,735,780 gallons per day. It is the intention to still further protect the pure water pipe by placing concrete around the joints in the river section.

Laying intake pipe. The rock between old and new aqueduct will be removed, forming one large mill pond to overcome anchor ice troubles

The available horse power from both aqueducts will be as follows:—

	Head	H.P. of water	
Old Aqueduct.	23 ft.	1150	
New Aqueduct	23 ft.	1645	
		——	2795 h.p.
Old Aqueduct	30 ft.	2320	
New Aqueduct	30 ft.	3315	
		——	5635 h.p.

The work was first recommended as being necessary in 1905, but it was not until September, 1908, that the City Council made the required arrangements, when the work was immediately started and has been carried on continuously by day labor ever since. Whenever practicable it has also been carried on at night. At present it is about complete.

Old and new aqueduct. Pumping station on right

The estimated cost of the work was $300,000, of which $210,000 was for the aqueduct and $90,000 for the intake pipe. From present indications it will be finished within the estimate.

Shoring the 12-storey Wolfe building in New York City presented unusual difficulties, partly due to its small base and to a greater extent because of the inability to shore from the inside of the structure. This was due to machinery occupying most of the basement. The work was accomplished, however, by the use of long inclined frame pushers seated on oak bed-blocks and equipped with shoring screws. The top of each leg of the pusher was fitted into a drop-forged hemispherical cap, which in turn fitted into drop-forged sockets on the under side of structural steel brackets bolted to the building columns. Daily readings with a level were taken on these pushers and necessary adjustments made with the shoring screws.

Reporting on building conditions and trade prospects at Welland, Ont., Mr. D. T. Black, Town Engineer and Building Inspector writes: "The building conditions and general trade prospects show signs of great activity for this year. Last month the council let the contract to pave two miles of the main streets, work to commence on May 1. The street railway company are making preparations to extend their lines on West Main, North Main, East Main, and South Main immediately the weather is suitable. These extensions will exceed four miles of new track. The building contractors expect this to be a record year. New factories and additions to old, new business blocks and a large number of new residences are the projects, in general."

Concrete Revetment Wall at Burlington Beach

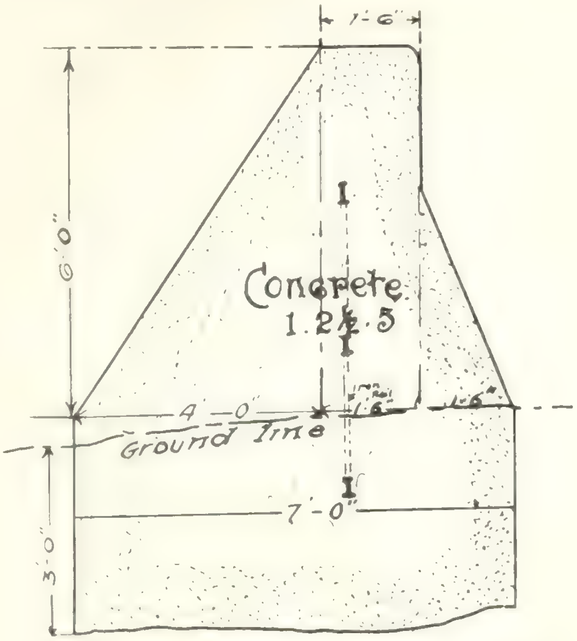
By E. G. Barrow, Hamilton, Ont.

THE construction of the concrete revetment wall at Burlington Beach was undertaken with a view to preventing the wearing away of the banks (which frequently occurred—especially when the bay water was high) which threatened to undermine and destroy the wide promenade walk, and also for the purpose of making about four acres of level ground as an esplanade and recreation ground for the public.

Burlington Beach is a narrow strip of sandy land situated between Burlington Bay and Lake Ontario, and is a popular summer resort. To preserve the shore from erosion as before mentioned was one of the objects of the Beach Commissioners. The wall is 1,600 feet long situated on the bay side of the beach and in about two feet of water. It is south of the canal, connecting the bay to the lake. At each end is a return or piece of wall at right angles to main wall and about 100 feet long, connecting the wall to the shore.

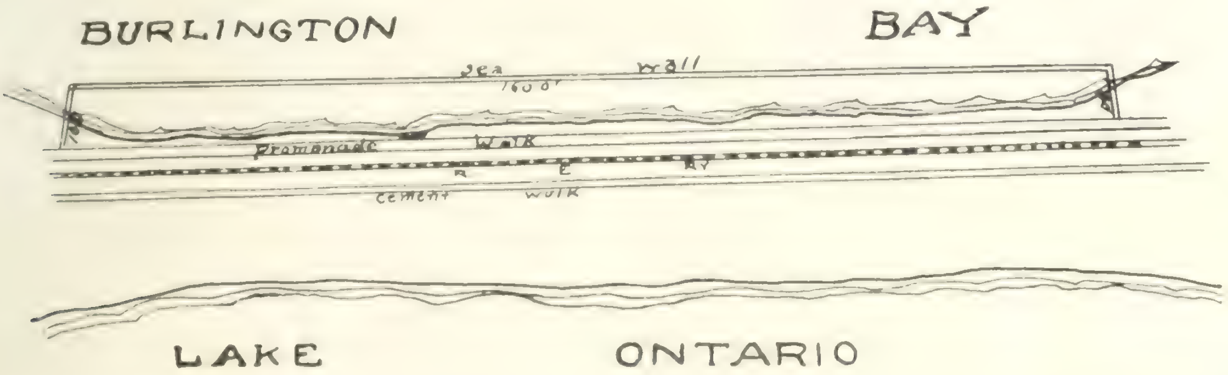
The wall was built in forty-foot lengths. Each length contained three iron rails, placed longitudinally above each other and spaced equally apart, joined at intervals of four feet by twisted iron bars or other equally strong pieces of iron. The ends of each forty-foot section were let into each other by what might be termed a tongued and grooved joint, three feet by one foot in size. The cement was a 1-2½-5 composition, the sand and gravel being obtained from the beach, nearby. The contract was let to Mr. Joseph Battle, of Thorold, for $23,000 and was commenced same year. Besides the construction of the wall, the in April, 1911, and completed in November of the contractor had to fill in the space between the wall and the walk, a distance of about 100 feet and averaging fully five feet deep.

The dimensions of the wall will be readily understood by reference to the cross section. The contractor used forms composed of iron plates joined together at intervals by gas pipes, through which iron rods were passed and bolted, thus holding the sides together. When the concrete had set, the bolts were unscrewed and the gas pipes left in the concrete. These iron forms were 7 ft. x 7 ft. by 40 ft. The concrete was machine mixed and carried to the forms by a derrick having a bucket containing about one yard of concrete, which was tipped into the bottom of the forms. The sloping part, or top part, of the wall was built with wood forms. Rails were laid along the shore on which the derrick was shifted as the work proceeded. The filling behind the wall was done by a sand dredge, or "sucker" as it is commonly called, and is very compact, no shrinkage having taken place. Filling made by this class of dredge appears to have no shrinkage or settlement and if circumstances permit it is doubtless the cheapest and most satisfactory way to make the fill.



Cross section of sea wall at Burlington Beach, Ont.

At the present date no sign of any crack or defect has appeared.



The building permits of Vancouver totalled $3,335,407 for the first three months of 1912, compared with $4,607,330 for the corresponding period of 1911. In explanation of the decrease Building Inspector Jarret writes us: "Although the first three months have fallen over one million dollars below the first three months of last year, the prospects are that the increase for 1912 over last year will be two millions or more. The heavy building for the year has not yet come in. Numerous expensive buildings of which the plans are not yet complete will be under way within the next couple of months."

According to Building Inspector Harrison of Saskatoon, the conditions and prospects for builders and contractors in that city are excellent. No large permits have been taken out as yet, but an extraordinary quantity of work is contemplated. Trade is good generally and the prospects are bright for a record building year.

Fundamentals of Highway Engineering

Careful Investigations Necessary to Determine Best Methods and Types Comprehensive Knowledge of Materials and Machinery Essential

Specially Contributed by Professor A. H. Blanchard, M. Am. Soc. C. E.*

THE art and science of highway engineering has developed to such an extent during the past decade that to-day the profession finds itself at the dawn of a new era. Not only are brother engineers recognizing the present important status of highway engineering, but the public is beginning to realize that the construction and maintenance of roads and pavements cannot be left to the politician or to inefficient and inexperienced officials if economical and efficient results are to be secured, but requires the skilled services of specially trained highway engineers.

The fundamental principles of the construction of certain types of highways has been well developed and in many cases religiously followed. The fundamentals of the broad subject of highway engineering, however, are only given consideration by an all too limited group of engineers of broad horizon.

Professor Arthur H. Blanchard

Independent of whether the highway engineer is the chief of a provincial bureau or a municipal department, it is of vital import that he should consider the problems presented from the standpoint of the welfare of the entire unit over which he has control and its relationship with adjoining areas. At the root of a successful administration of a highway department will be found ever alert attention to the system of highways under its jurisdiction. The necessity of looking forward many years and providing economically for future growth as a whole and extraordinary development along certain lines is self evident. To provide for future traffic, for instance, does not mean enormous outlays which result in the construction of monumental highways which for years to come will not be used to an extent comparable with the expenditure necessary to construct them. To build highways through narrow rights-of-way and upon foundations which will be found inadequate to accommodate and carry the traffic of ten years hence is not, however, sound engineering.

In the past certain fundamental principles of highway engineering have apparently been recognized. Provided all elements of good design of a particular type of road or pavement have been fulfilled, the engineer, his superiors, and the public have been satisfied, in most cases. To go further than this and devote the requisite thought and money to determine if the type of pavement or road adopted for a certain locality was economical and suitable for the given locality has not generally been considered necessary. Preliminary investigations of local conditions is evidently an important fundamental of highway engineering. In order to approach the ideal solution of the problem of the selection of the proper type of road or pavement, it is necessary to secure information covering an investigation of traffic, alignment, grades, curves, widths and foundations from the standpoint of present and future requirements; records covering materials suitable for road building that occur throughout the area; topographical features, including profiles and cross levels, property lines, intersecting roads, car tracks, buildings and similar details; data relative to methods in vogue or proposed for cleaning and dust laying, methods of maintenance, climate and range of temperature, cost of materials and labor and other items of a similar nature. The following recommendations contained in the 1912 Report of the Special Committee on "Bituminous Materials for Road Construction" of the American Society of Civil Engineers, should receive careful consideration. "Your Committee desires to emphasize the fact that experience has demonstrated the value of traffic censuses taken both preliminary and subsequent to the construction of a highway. The traffic census should be considered one of the most important variable factors in the solution of that important problem, the selection of that type of road or pavement best suited to local conditions considered from both the standpoints of economy and efficiency. In connection with the census returns on any road should be considered the traffic on cross and parallel highways and the effect of improvement of these highways on the traffic on the highways under consideration. It should not be taken for granted that the bald return of a traffic census should be the sole basis of the selection of the type of road or pavement, but it should be considered a guide in estimating the value of the type of construction adopted. The form for a traffic census proposed by your Committee has proved satisfactory and its future use is recommended."

Relative Value of Various Types

In order to select the best type of road or pavement for a given location, it is of vital import that the relative value of various types from many standpoints should be given careful thought. Among the many points of vital importance are those of annual cost, first cost, ease of traction, non-slipperiness, ease of cleaning, noiselessness, non-productiveness of dust, suitability for road users, and ease of maintenance.

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* Consulting Highway Engineer, and Professor of Highway Engineering [illegible]

In connection with the comparison of the relative values of different kinds of roads and pavements, attention should be given to the intimate relationship existing between the status of a given type and the personnel of the organization which has charge of construction and maintenance. It is self-evident that, under suitable local conditions, a macadam road finished with a bituminous surface and maintained under efficient supervision and the patrol system of maintenance, has an entirely different value in a table of comparisons than a similar type of original construction which, because of criminal negligence, will be classified as a failure, due to total disintegration, within three or four years. To organization many highway engineers should give much thought. The beneficial results accruing will be beyond comprehension in many instances.

An effective comparison of pavements is based on many items, among others cost data. It is to be regretted that opportunity or financial support is not afforded in many instances, while many engineers do not appreciate the benefits derived from the compilation of cost data. Again, the writer quotes from the 1912 Report of the Special Committee on "Bituminous Materials for Road Construction:" "In the work of the Committee, it has become apparent that conclusions may necessitate the use of cost data, recorded along uniform lines. It seems urgent that standards for arriving at costs be established and generally adopted as promptly as possible. Your Committee therefore recommends to the attention of the profession this important feature of engineering work, with the hope that uniform methods will be generally adopted at an early date for reporting costs of construction, such as those proposed by this Committee in its Report Forms."

Considered under the heading of fundamentals of design the highway engineer must consider with care the materials of construction, the problems of alignment, grades and widths, surface drainage, sub-drainage and foundations, and the details of the design and cost of the particular type of road or pavement selected, together with the methods and cost of maintenance which will be inaugurated after the completion of the highway.

Characteristics of Materials

That the characteristics of materials of construction are of fundamental importance is obvious by a study of the multitude of specifications which have been issued during the past five years. The materials are many and varied, ranging from rock, gravel, sand, clay and loam to wood, brick and myriad varieties of bituminous materials. To utilize these materials to advantage, their economic and physical characteristics must be known and in many cases a knowledge of their chemical properties is likewise essential. Although standardization of methods of testing road materials is of recent origin, comparatively rapid progress is being made, so that in the near future engineers, as well as contractors and manufacturers, will be able to converse in a common language with attendant beneficial results. More important than the methods of testing is the interpretation of the results of tests. Unless this knowledge is at hand it is impossible to draw up original specifications under which the engineer can secure the material which is wanted and exclude undesirable material. In many cases the engineer should not presume that his knowledge of the chemical properties of a material warrants the determination by him of the limitations which should be set, but, realizing the danger of drawing his specifications based on wrong hypotheses, the consulting chemist should be called upon to pass on pivotal clauses of a chemical character.

The problems of alignment, grades and widths, important as they have been in the past, under modern conditions have assumed an aspect which has rendered a different prospective imperative. The nicety of design of railroad grades and alignment may never be characteristic of highway work, but that the introduction of the touring car and motor truck has materially altered the basis of design is apparent. As an example may be cited the attention now given to the design of curves on country roads so that dangerous sharp turns, by which the motorist cannot see, may be eliminated. Again, on many trunk highways consideration is being given to the feasibility of providing a sufficient width of travelled way so that slow moving motor truck traffic and horse drawn commercial traffic may not obstruct the right of way of the touring or passenger motor cars. As transportation of the products of farming and manufacturing becomes monopolized by the motor truck, so will the importance of the new basis for design be more and more recognized and adopted.

Likewise those cardinal fundamental elements of design, sub-drainage, foundations and surface drainage have been given during the past decade more attention than ever before. Foundations, once thought adequate, have failed under the ever increasing loads to which the roads are subjected, while standards for the crowns of surfaces, due both to the introduction of new types and the tendency for greater distribution of traffic, have been materially modified.

To-day the art and science of constructing and maintaining the wearing surface, due primarily to changes in the character of traffic, is replete with problems of a complex nature. Many of these are being solved on a rational basis through the medium of committees of our national engineering societies and by experimental work conducted on scientific lines. The necessity for logical solutions based on the same sound principles which have always governed the design of the wearing surface exists as much to-day as in the days of John Loudon McAdam.

Before closing this brief review of the fundamentals of highway engineering, mention should be made of the value of a comprehensive knowledge of all types of road machinery which may be used in construction and maintenance. The use of modern road machinery may, in many cases, modify the design and be a controlling factor in the selection of the type of road or pavement to be used, or in the determination of the system of maintenance to be employed on a system of highways.

In a recent communication to this journal, Mr. H. W. Meech, Building Inspector, Lethbridge, Alta., reports: "The city's building permits for the first quarter of 1912 totalled $2[illegible]8,770, an increase of nearly $100,000 over the corresponding period of last year. It would seem that we have entered upon a period of unexampled activity in the building trades here. There are no disturbing elements in the situation."

Broken Stone in Road Construction

Depth of Stone Varies with Sub-Soil and Traffic—Limestone Commonly Used in Ontario — Quarry Output Increasing

Specially Contributed by W. A. McLean, Engineer of Highways for Ontario

ROAD metal, in the construction of macadam and gravel roads, serves three important purposes. It distributes the concentrated wheel load over a greater area of sub-soil; it forms a water-proof covering to protect the sub-soil from the softening effects of moisture; it forms a hard and durable wearing surface. The depth of material used, the method of placing it on the roadway, and the quality of material used, should be proportionate to the three main factors previously stated. The concentrated wheel load controls largely the depth of material to be used; the necessity of having a waterproof coat emphasizes particularly the method of placing the road metal; and the need for a hard and durable covering, is met principally by the quality of stone selected.

Mr. W. A. McLean

The foregoing rule is general, and while a greater depth of material makes a more waterproof surface, and will wear longer than will a thin coat; and while certain qualities of stone have better binding qualities, and, therefore, are more water-proof and will distribute the load at a wider angle, yet in a broad way the three requirements are responded to in the manner stated, viz.—distributing power—depth of material; water-proofing,—method of applying; durability under wear—quality of material.

Distributing Power—Depth of Material

When a wagon carries two tons, it is apparent that each wheel places on the roadway, along a line which is the width of the wagon tire, a load of 1000 pounds; if the wagon and its load weigh four tons, the concentrated load on a line the width of the wagon tire is 2000 pounds. This may be assumed to be communicated to the roadway through a single cube of stone 2 inches square.

Experience shows that from this cube, on a well consolidated roadway, the weight is distributed at an angle of about 45 degrees; and it may be shown that the area of sub-soil over which the load is distributed, is equal to a square the side of which is twice the depth of the stone.

The supporting power of soil may be instanced by an extract from the Ontario Standard Specifications for Concrete Bridges, in which the bearing strength of soils, under foundations, is stated as follows:

Rock in thick beds	25 tons per sq. ft.
Strong gravel and coarse sand, dry...	8 tons per sq. ft.
Compact sand or firm clay, dry	4 tons per sq. ft.
Clay, moderately dry.. ...	2 tons per sq. ft.
Clear, dry sand, not cemented	2 tons per sq. ft.
Wet clay..	1 ton per sq. ft.
Quicksand and wet, yielding soils	0 to ½ tons per sq. ft.

While the foregoing may be accepted as a safe guide for the depth of stone under heavy foundations, yet underneath a roadway, in which the protection from moisture is always insecure, safe loads under the macadam, should not, with a proper factor of safety, be taken as exceeding one-quarter the amount stated.

From this analysis of the case, the importance of thoroughly draining the sub-soil becomes apparent; particularly with a view to securing the greatest possible strength at the time of greatest danger, which is during the spring thaws and freshets. It becomes apparent also why 4 inches of stone placed on a strong, dry, gravel sub-soil may be as effective and durable as 12 inches of stone placed over a wet, slippery and poorly drained clay; and why a Telford or other strong foundation is at times essential over such a clay, and over a soft marshy sub-soil. And it explains also why in a given mile of road, the depth of stone and character of foundation used, may be varied half a dozen times in order to secure a roadway of uniform strength throughout the entire length.

Waterproofing—Method of Placing Stone

A waterproof covering is one of the important features of a good macadam road, and this is largely obtained by the method of placing the stone. This requires a certain depth of material, not less than four inches; sufficient bonding material, which in waterbound macadam should be stone screenings; thorough consolidation by rolling; and a proper camber to shed water to the side gutters or drains.

The depth of metal must in the first instance be proportioned to the strength of sub-soil and the concentrated wheel load, but a minimum depth of four inches is essential as that is the least depth that can be properly bonded by rolling.

Loose broken stone has about 50 per cent. of voids. If laid loosely on the road, without rolling and bonding, it will not shed water; but is merely a sieve through which rain and melting snow pass. The subsoil is at once softened by moisture, and into this mud, the broken stone is forced by traffic, rutting the road and wasting the stone.

To prevent this condition, sufficient fine material should be used on the road to fill the voids for some depth from the surface, and when rolled to thoroughly bond the stone, leaving a smooth water-tight surface, from which rain is at once shed to the gutters.

Rolling clearly takes an important place in making a water-tight surface. If this is not done, the damage to the road results, before the metal becomes bonded by traffic, and a considerable amount of the loose stone is driven into the mud and is largely wasted. Many gravel and stone roads in Ontario have had two or three feet of metal placed on them and forced into the mud in this way. With the voids filled with earth, the stone is of little use other than to strengthen the foundation in a very inferior way. Economical construction requires a road crust of well-bonded stone laid in a well defined and uniform layer.

The camber of the road surface should be in keeping with the quality of the stone, and methods of construction. An average crown of one inch to the foot from side to center is often specified, and this applies to the class of road ordinarily built in Ontario. This will provide for some settlement after construction. Except in the most expensive type of construction a new road should be given a crown that is too high, otherwise it will soon become too flat under traffic. It follows that in maintenance, the surface should be kept smooth and free from ruts and wheel-tracks in order that the flow of water from the surface will be immediate, and that none will have time to soak into the road.

Broken stone should be separated into grades according to size, the coarser stone to be placed in the bottom of the road and the finer at the top. This grading of stone is done by means of a rotary screen attached to the crusher. If the stone is placed in the road without being graded in this manner, the smaller stones wear away more rapidly than the larger, and a rough surface results. Large stones at the surface, moreover, are more apt to become loose, to roll under the horses' feet or the wheels.

For common country roads and using limestone, there should be placed in the roadbed:

(a) In the bottom, a layer of stones such as are refused by a 2½-inch or 3-inch ring—"tailings."

(b) On this a coating of stones such as will pass through a 2½-inch or 3-inch ring.

(c) On this a sprinkling of screenings—that is, the dust and chips created in crushing, and including all that passes a 1½-inch screen.

Course (c) should be a thin covering, not more than enough to bond the stone when rolled. The main body of the road should be made of the grade (b).

Properties of Stone

The important properties of a good stone for road making are: (1) hardness, (2) toughness, (3) cementing properties and (4), resistance to atmospheric action, including low absorptive qualities.

A stone may be very hard, and yet very brittle, so that toughness as well as hardness is necessary. A stone the dust of which will cement strongly, and recement when broken, makes a smoother and more waterproof road, and one which will distribute a concentrated wheel load at a wider angle. For this reason limestone, because of its cementing properties, is a less inferior road metal than its softness would indicate. And some rocks when first quarried are hard and tough, yet through atmospheric action, decay rapidly. Rocks which absorb a large percentage of moisture are generally acted upon in this way by the combined action of moisture and frost. Low absorption is therefore desirable; and this is generally indicated by the weight of the stone, the heavier stone being more desirable in this respect.

The quality of stone is not a matter of name, as varieties of the same kind and even from the same quarry may differ greatly. Those who are familiar with limestone quarries know the great variation in hardness and toughness, between adjacent strata.

All things considered, the relative desirability of rocks available in Ontario for roadmaking may be placed in about the following order: (1) Trap; (2) Syenite; (3) Granite; (4) Limestone; (5) Schist; (6) Gneiss; (7) Quartzite; (8) Sandstone; (9) Slate; (10) Mica Schist; (11) Marble.

The name "trap," is one of very general application, and is usually applied to the black and green stones which, found in the fields, are known as "nigger-heads" and "hard-heads." For some years, this material has been quarried at Georgian Bay, and shipped to cities in the United States. In older Ontario, the most convenient point at which it occurs is near Havelock, in Peterboro County, on the C.P.R. While trap is a most durable stone, yet considerations of economy and first cost will generally dictate the use of a softer and less durable stone of the locality in which the road is being built.

Throughout Western Ontario, limestone is common, and the greater mileage of roads is now being constructed of that material, since quarries are within easy access by rail of almost any part of the province. Limestone ranges in quality from that which is very soft and decays rapidly, to that which is very tough, with strong cementing properties. If tough and close-grained, it is an excellent material for roads on which the amount of traffic is not excessive. In some parts of Eastern Ontario, granite, gneiss and schist are being used, and are proving very suitable. Granite is a harder, and tougher stone than limestone, but its cementing properties are inferior; and a good practice, when granite is employed, is to use limestone screenings to bond the road.

Field stone are frequently used. Picked up from the fields, they are usually found to consist of fragments of trap, granite, gneiss, limestone, sandstone, and other varieties. Owing to lack of uniformity, the deficiency of this material is that the softer stones wear more rapidly than the others, and in consequence, a rougher surface is ultimately produced under traffic. Field stone, however, form a good source of supply for road metal, and if obtainable in the locality, should generally be used in preference to stone shipped in by rail.

Reliable tests of roadmaking material have been devised, relating to crushing strength, degree of toughness, degree of hardness, cementing properties, and absorption as indicated by weight or specific gravity. No test is so conclusive, however, as actual wear on the road, and old roads in the locality may be instructive.

Simple tests may also be applied. We may judge of the qualities of a stone by breaking with a hammer, wearing on a grindstone, crushing it in a blacksmith's vise, scratching with an iron nail, breaking small pieces with the fingers. A heavy stone is usually better than one that is light. A stone that breaks into cubical shapes is desirable, while one that breaks into thin, flat shapes, is objectionable.

As previously suggested, the stone of the locality in which the road is being constructed, should generally be used. Freight rates and additional cost of hauling, will often add 50 per cent. to the cost of the road as compared with the cost of a road made of stone obtained in the vicinity. It is usually better to accept an inferior stone, and resurface more frequently, than to pay freight rates on a more durable stone shipped in from a distance. This, however, will depend somewhat on traffic, and where travel is extremely heavy or constant, it may be in the interest of economy to pay freight rates for the more durable material. At times it is good practice to use soft material of the locality, for the foundation of the road, and surface it with a tougher and more durable material, placing about 4 inches of the latter on the surface.

The number of quarries in the province is steadily increasing, and their output is growing from year to year. With the present agitation for good roads throughout Canada, there is every indication that the demand for crushed stone will increase to very large proportions, and it is to be expected that facilities will be provided for obtaining a better class of stone, particularly for surface use.

Interesting Features of Engineering Work at New Westminster, B. C.

THE improvements carried on at New Westminster, B.C., during the three years that the present City Engineer, Mr. J. W. B. Blackman has been in office, represent approximately $1,559,000. The programme for the present season entails an expenditure of over $1,000,000 and includes a large sewerage scheme for Sapperton comprising some forty-five miles of sewers, the paving of about fifteen miles of streets, and the construction of a five million gallon reservoir.

The city has completed a 25-in. water main which is delivering some six and a quarter million gallons daily. Negotiations are now in progress with the municipality of South Vancouver for a supply of three million gallons daily for three years.

The harbor improvements scheme, which has been completed under the direction of Mr. A. O. Powell, of Seattle, will make this city one of the finest fresh water ports on the Pacific Coast.

Details of the garbage scow used at New Westminster are reproduced on the opposite page. The garbage not burnt is tipped into a scow of the design shown, from hoppers, approached by a driveway, with a grade of 5 per cent. The hoppers hold about the same capacity as the scow.

Placing pipe in position at Lulu Island Bridge

The scow is towed out to sea where the contents are dumped. There are six hopper compartments, the doors of which are opened easily by one man by means of the winches shown on the plan. The doors of one set of hoppers are operated simultaneously and are held in position by small chains which are released before the winch is operated. The bottoms and sides of the compartments are lined with sheet steel. The scow is stoutly built as rough weather is often encountered. The cost of the scow was $3,200.

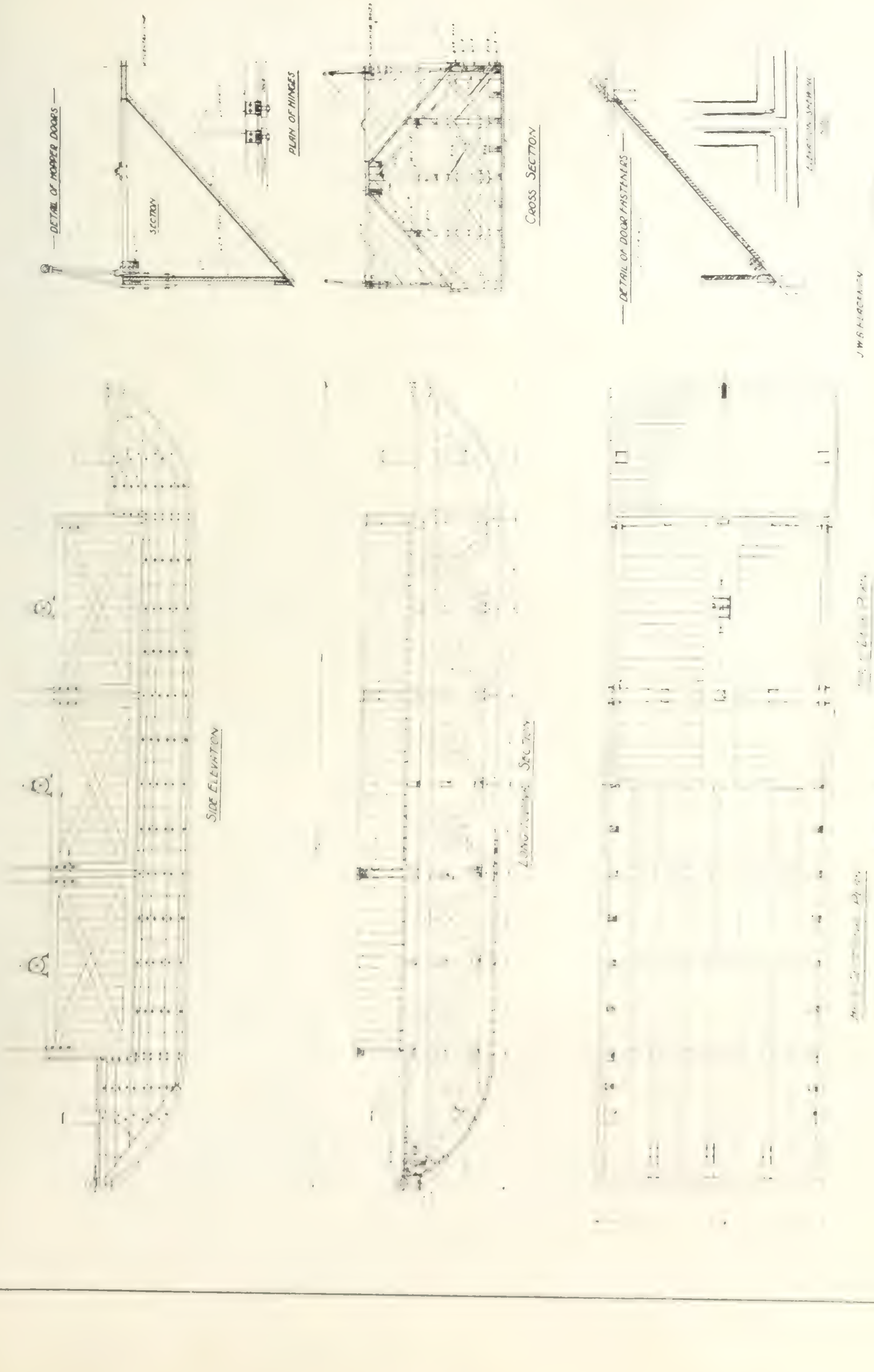
The accompanying photographs are views of the laying of the 13-in. flexible jointed water main across a portion of the Fraser River. The length was thirteen hundred feet and the pipe was the Canadian Boving Company's patent muff joint. The pipe was built upon pontoons and lowered from the bridge by means of blocks and tackle. A channel in the river bed was dredged previously.

Pipe laid on small scows preparatory to lowering

The lower picture shows the 13-in. diameter steel water main, with Canadian Boving Company's patent high pressure muff joint, being placed into position at Lulu Island bridge over the Fraser River at New Westminster. The pipes were successfully lowered as described above. The river traffic was not stopped, in spite of the fact that some five hundred boats pass through the bridge every month.

The upper view shows the pipe laid on small scows preparatory to being lowered to the river bed. By this means 1,300 feet was successfully lowered in 25 feet of water. The standing pressure was 110 lbs. per square inch and the fire pressure 180 lbs. The pipes were ¼-in. thick and in 10 and 15-ft. lengths. The river bottom was sand, and very undulating. At the draw span of the bridge, the river bed was dredged out to a depth of 25 feet. The joint of the pipe allowed a movement of 14 degrees.

The oldest frame house in the United States, located at Southampton, N.Y., has just been torn down by order of the authorities, who declared that it was no longer safe for occupancy. The house was built in 1618 by Thomas Sayre, an Englishman, who went to the United States in the time of Cromwell.



Details of Garbage Scow used at New Westminster, B. C.

The C. N. R. Viaduct at Winnipeg, Man.

Structure Crosses Three Streets and Contains 850 Tons of Steel— Built to Accommodate Compound Curve of Track

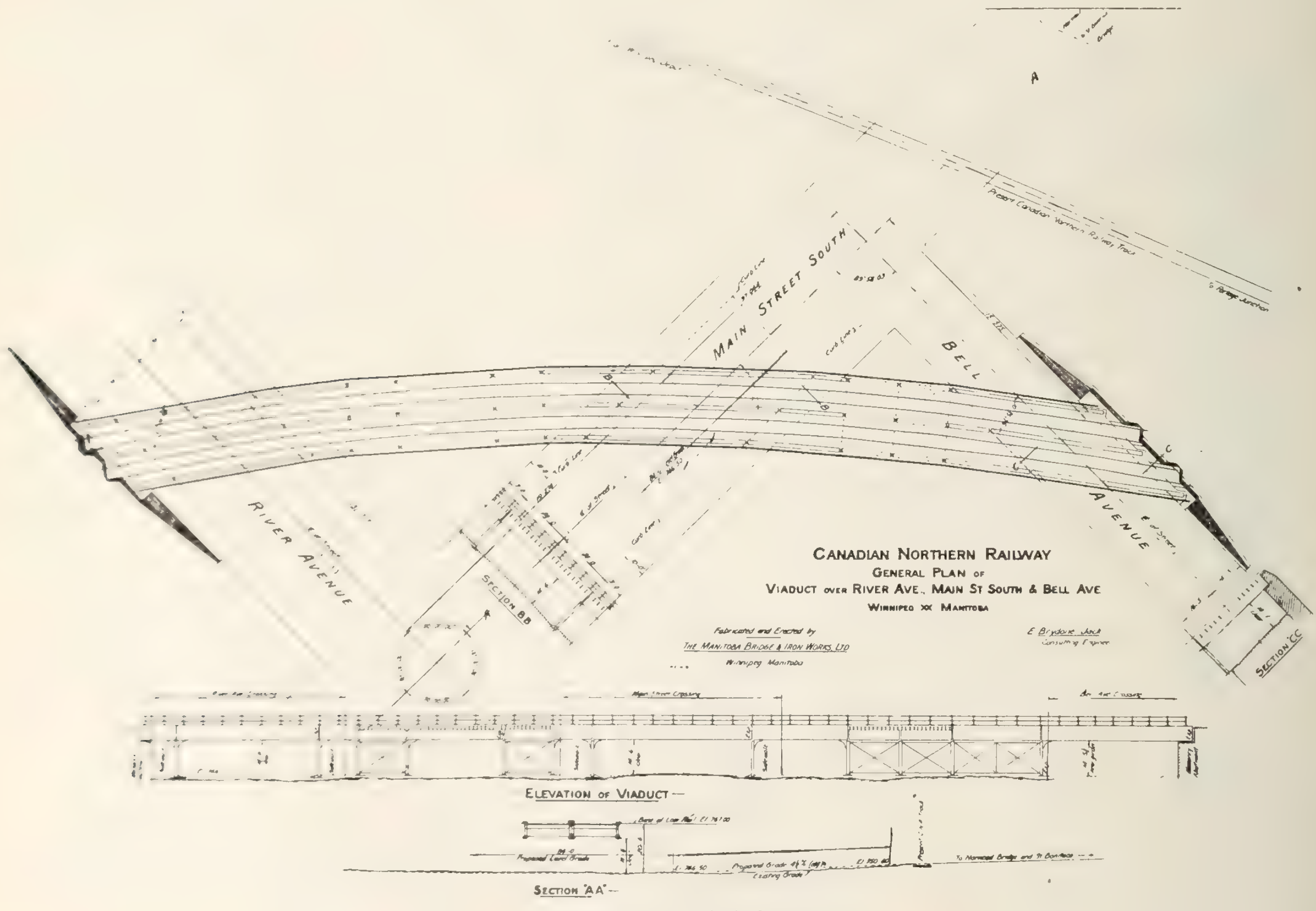
By F. E. Emery*

THERE is now being erected at Winnipeg, for the Canadian Northern Railway, a steel viaduct over Bell avenue, Main street south and River avenue, to carry the company's double track over the three streets and property between. The viaduct leads up to earth fill approach to the new bridge across the Assiniboine river, near the south entrance to the new Union Station. The designing, detailing, fabrication and erection are all rendered somewhat complicated by the fact that the viaduct had to be built to accommodate a compound curve of the track, as shown on the accompanying plan of the general layout of the structure.

The viaduct is designed to conform to the Dominion Government specifications of 1908 prepared by the Department of Railways and Canals for Class Heavy Locomotives as live load, and a dead load of 1400 lbs. per lineal loot. It is approximately 430 feet long on centre line with skewed ends which rest on concrete piers parallel to Bell and River avenues. The structure is made up of spans varying from about 15 feet to 66 feet, depending on the width of struts, the angle at which it crosses the streets and economy of design. The spans crossing the streets are made up of three half deck plate girders to give sufficient head room over the streets. This is 14 feet 6 inches for Main street and River avenue, and 14 feet 1 inch for Bell avenue, clear between crown of roadway and underside of steel. The spans between streets are made up of three deck plate girders of 20 and 40 feet spans.

As already stated, the two ends rest on concrete piers, while the girders at intermediate panel points are supported by columns resting on the concrete pier, the centre girder resting on plate and channel columns and the outside girders on lateral channel columns. Sheet lead is used on top of the concrete for the steel to rest upon.

The Bell avenue end of the viaduct is provided with expansion bearings on concrete pier, consisting of 1¼ plates planed to receive end bearing plate of girder provided with slotted holes to fit over anchor bolts, which permits girder to expand or contract longitudinally while the same bolts take care of the lateral forces due to wind and centrifugal action of trains on the curve. The longitudinal forces are transferred through the floor system to the girders, and thence to 20 feet deck spans at the opposite side of



General plan of viaduct

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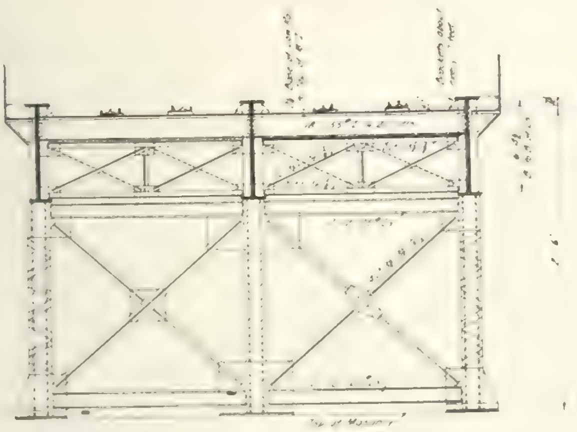
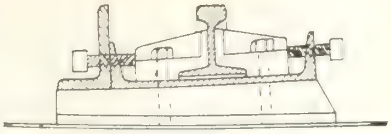
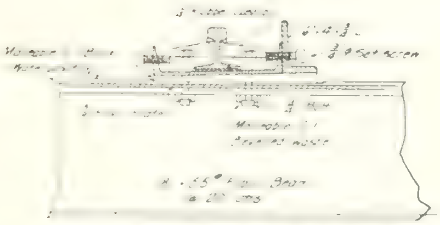
* Assistant Chief Engineer, Manitoba Bridge & Iron Works Co., Ltd., Winnipeg.



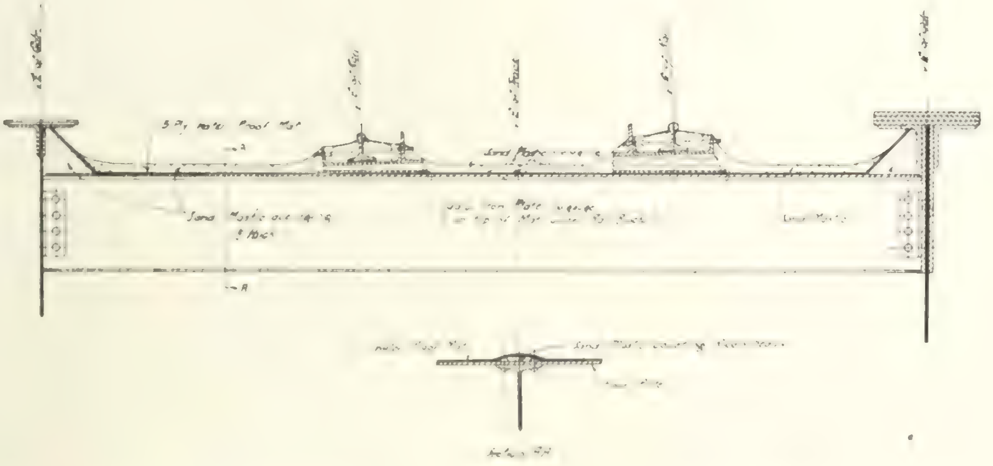
Typical cross sections through half deck spans



Typical section through upper rail



Typical section through lower rail



Constructional views of the C. N. R. viaduct at Winnipeg

Bell avenue. The columns and bracing are designed as a tower to transfer the stresses to the concrete piers. The connections of the girders to the top of the columns are designed to take 75 per cent. of all stresses concentrated there, while friction is depended upon to take care of the rest. Curved plate and angle brackets on the columns connected to the bottom flange of the girders help to strengthen the connection and give the structure a more artistic appearance. The details of all connections were extremely complicated owing to the fact that the girders cross the street at an angle of about 35 degrees, while the columns in panel points are set parallel to the streets. This necessitated many bent plate connections and will require turned bolts for part of the field connections where it is impossible to drive rivets with pneumatic hammer.

The girders are kept from overturning by the usual system of cross framing under the floor beams and are rivetted to stiffness. Lateral bracing in plane of bottom flanges carries the stresses to panel points, while the floor acts as bracing for the top flange, plate and angle brackets being put in about every seven feet between floor and top flange angles of half deck spans to decrease the unsupported length.

The tower system is followed out for the entire length of the viaduct. This necessitated providing for expansion of girders on top of columns about every 60 feet, which is accomplished by planed surfaces of plates between the girders and top of columns. The cap plates of columns are wide enough to allow of bars and plates being rivetted on to overlap bearing plate of girder, to prevent it from sliding off top of column. Longitudinal forces are carried from all panel points provided with expansion connections to the next tower. The River avenue end of the viaduct is anchored directly to the pier with anchor bolts through end bearing plates.

The bracing between columns consists of latticed channel struts and angle diagonals constructed in the usual way, though some of the connections require special details owing to the curve of the viaduct. Most of these connections are accomplished with heavy bent gusset plates and many of them will require turned bolts for field connections where it is impossible to get in rivets for lack of room.

The floor system, with method of fastening rails, contains many special features. The floor itself is ⅜ in. plate throughout, laid on 18-in. I-beams, 55 lbs., for floor beams, spaced 20 in. centres, which are connected to webs of girders in half deck spans and rest at top flange of deck spans. At the Bell and River avenue ends, and at the expansion joints, which are all skewed, the floor beams could not be connected to girders at both ends. A floor beam cross girder was designed to carry the loose ends of floor beams. These girders are connected to the main girders with bent plates and at the Bell and River avenue ends they are further supported by cast iron pedestals near the ends which rest directly on the concrete piers. These girders also act as cross frames at these points.

Where the floor beams connect to webs of girders, a 3½ x 3½ x ⅜-in. shelf angle has been rivetted to web for beams to rest upon in order to facilitate erection. The floor plates will be rivetted to floor beams in field and the whole surface waterproofed to specifications prepared by the Canadian Mineral Company, Limited, of Winnipeg, and approved by the engineer.

The malleable cast iron rail blocks will be placed directly over each floor beam, which has holes punched to suit bolt holes in castings. These are of two patterns, those to be used under the inside rail of the curve being about 1 inch high in centre and those under the outside rail about 3 inches high in centre. Both patterns have bevelled tops so that the rails will set slightly inclined to the vertical to accommodate the curve. On the top of the castings a 15-in., 33-lb. channel will be laid with back down throughout the length of the viaduct. The channels are to receive the rails and fastening devices and are provided with expansion connections over all the expansion joints in the viaduct. To the outside flange of the inner rail channel and inside flange of outer rail channel, 6 x 4 x ¾ angles are rivetted with 6-in. leg vertical and 4-in. leg flush with back of channels, which serves as a guard rail. This makes a bearing surface on top of casting of 19 inches.

In the centre of web of channel a hard rubber cushion, ¼ in. thick and the same width as the base of the rail, will be placed under the rail to reduce vibration and noise as much as possible. Special malleable cast iron rail clips have been made to hold the rails in place. These are to be bolted through the cast block floor plate and flanges of floor beams, malleable cast iron bevelled washer being used between bolt head and underside of floor beam flange. Both flanges of rail channel and angle rivetted to flange have been drilled and tapped for ¾-in. set screws which will bear against the rail clips in such a way that they may be set with the rail to the exact curve of the track. This arrangement for adjusting the track greatly facilitated the detailing of the floor system, as it would have been very tedious to calculate the exact location of rails on each floor beam and locate holes so that track could be bolted down with rail clips and cast blocks in exact location to suit curve. Even had these calculations been made, the variation in the steel due to fabrication and erection would have made it next to impossible to get the rails down without some means of adjustment.

There will be a sidewalk 2 ft. 3 in. wide on each side of the viaduct made of pebbled plate for half deck spans, the inside edge of which will rest on the top flange of the outside girder; the outside edge of the plate will rest on a 10-in. channel supported by brackets rivetted to stiffeners of girder. The floor plate and beam of deck spans extends 2 ft. 3 in. beyond the centre of the outside girder. On the edge of this a 12-in. channel placed at right angles to the floor beams forms a curb to finish waterproofing against and also acts as a support for the hand rail which will run the full length of the viaduct on both sides. The extension of the floor over the deck girder serves as a sidewalk for these spans.

The details of the steel work were very complicated and required 150 standard sized sheets, all of which were approved by Professor Brydone-Jack before they were put in the shop. When completed the structure will contain approximately 850 tons of steel.

The viaduct was designed by Professor Brydone-Jack, consulting engineer, Winnipeg, and is being fabricated and erected by the Manitoba Bridge and Iron Works, Ltd., of Winnipeg. The work is being done under the direction of Mr. W. L. Mackenzie, Bridge Engineer for the Canadian Northern Railway at Winnipeg.

Mr. Harry F. Clayton is the new General Manager of The Canadian Boving Company, with head offices at Toronto.

Hamilton Firm's Interesting Operations

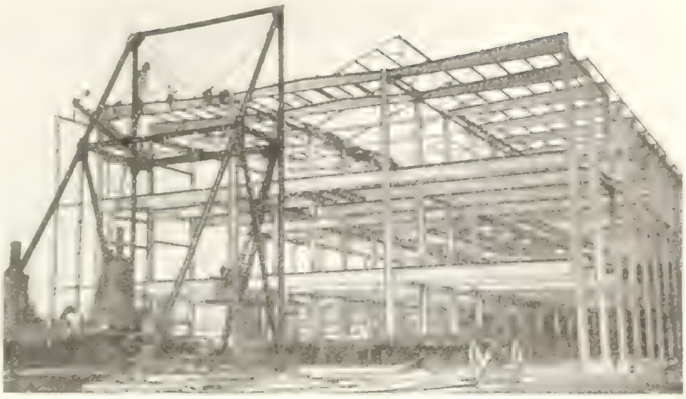
In connection with the extensive additions now being made at the Hamilton plant of the Steel Company of Canada, Limited, the Hamilton Bridge Works Company, Limited, have a large contract, some details of which are given below.

The first view shown is an end elevation of the structural steel frame of the rod mill. This building has a total length of 550 ft., divided up into twenty bays of 25 ft. each. The total width is 86 ft., the height of columns or to the underside of the trusses 30 ft. clear and the depth from the floor line to the top of the monitor 60 ft. The design is the ordinary type of roof trusses with heavy columns supporting crane runways on which heavy cranes will operate. The roof and sides of this building will be enclosed with corrugated iron, with the necessary provision of windows, doors, etc. The total weight of the structure is about 400 tons.

1—Steel Company's rod mill

The erection of this work was performed very rapidly. Counting several days of exceedingly bad weather, the whole work was erected in less than three weeks. The speed was due very largely to the use of a steel tower traveller, shown in Fig. 2. The second photo shows the traveller lifting a crane runway girder into position and also the large crane runway that is being erected in connection with this building. This runway is 400 ft. long and has a clearance of 22 ft. 6 in. from base of rail to the underside of crane girders. It is located between the sites of the Rod mill and the Bloom and Billett mill. On the completion of the Rod mill the machine was backed up through the opening left on each side of the crane runway and lifted up the missing girders and placed them in position. Fig. 3 shows the steel work in the Assembly Building erected last summer with this same traveller for the Oliver Chilled Plow Works of Canada, of Hamilton. This building is three storeys high and the speed with which the steel was erected with this machine was remarkable.

2—Steel tower traveller lifting crane runway girder into position

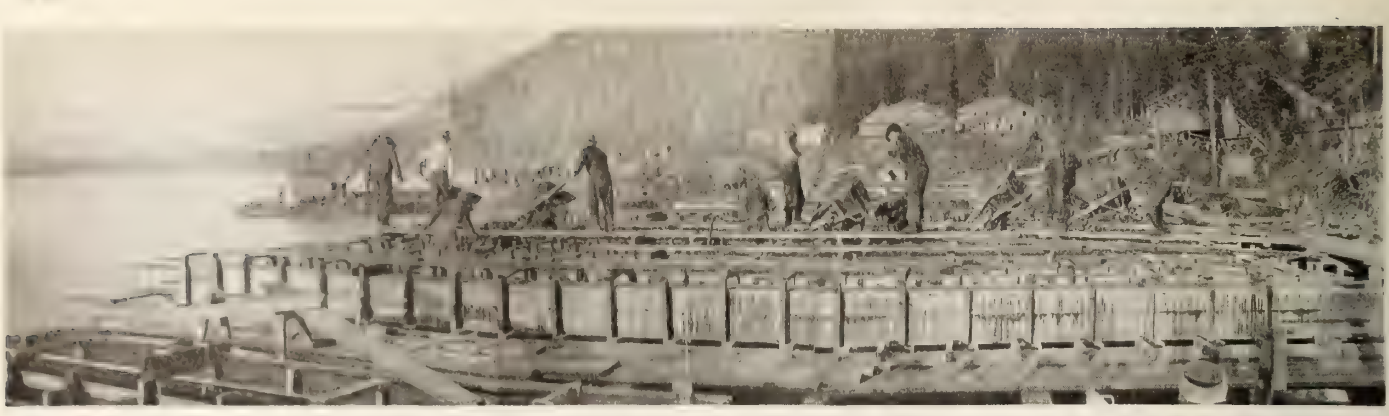


3—Steel Work for Assembly Building of the Oliver Chilled Plow Works

In Fig. 4 there is shown another special erection appliance,—a steel derrick car capable of handling very large and heavy railway work without the use of falsework as in the old days. The view in question shows the Hamilton Bridge Company's Car No. 8 placing one girder of a 70 ft. standard deck plate girder span on the line of the Canadian Pacific Railway between Guelph Junction and Hamilton, the weight of the piece in question being 39,000 pounds.

4—Placing a large girder on C. P. R. construction

The city of Moose Jaw, Sask., is anticipating a record building year. The building permits issued in the first two weeks of April represented a value of more than half a million dollars. Included in the permits was one of [illegible] for the new post office, the excavation for which has already been commenced. Residential work promises to be exceptionally active at Moose Jaw this year.



Making ferro-concrete piles for wharf at Prince Rupert Depot

New Marine Depot at Prince Rupert, B.C.

Contributed by Lt.-Col. Anderson, Chief Engineer Department of Marine and Fisheries

THE largest single piece of work undertaken by the Chief Engineer's branch of the Department of Marine and Fisheries during the past year has been the establishment of a lighthouse and buoy depot at Prince Rupert.

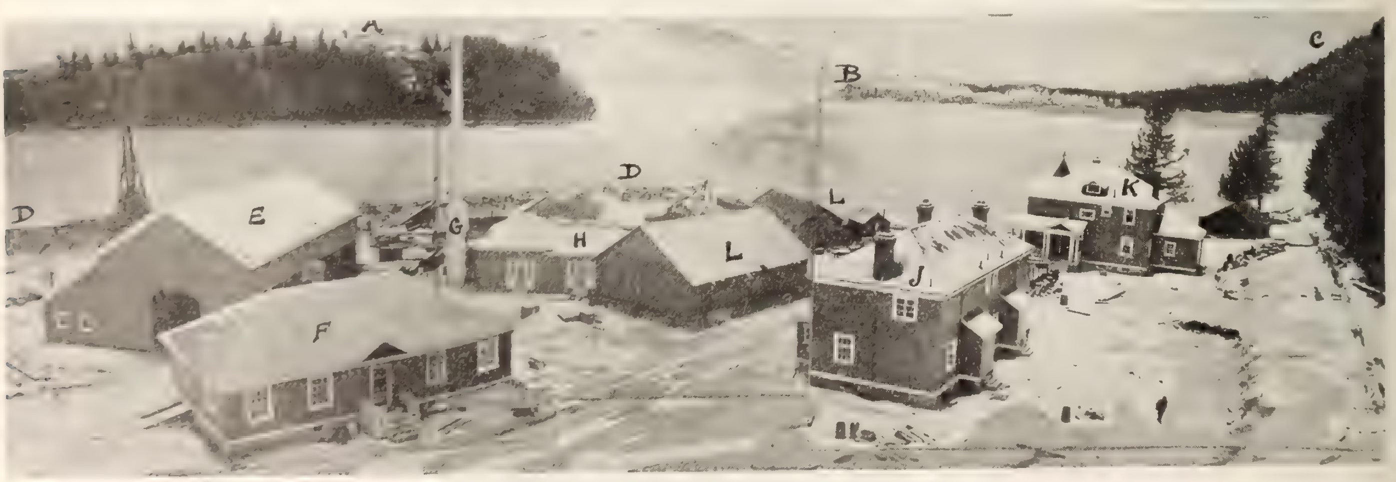
Up to the present the whole of the lighthouse and buoy work of British Columbia has been handled from the Department's agency at Victoria, but in consequence of the extension of the aids to navigation into northern waters, following the discovery of gold in the Yukon, the exploitation of the Queen Charlotte islands by miners and lumbermen, and the choice of Prince Rupert as a terminal point for the new Transcontinental Railway, aids to navigation in the northern district have become so numerous that it was found impossible to give them proper attention from a base five hundred miles distant. For this reason the Department determined upon the establishment of a depot at Prince Rupert, and a very convenient site was found on the shores of Casey Bay, on Digby Island, about three miles from the centre of the new city. A lot of land containing four acres was secured from the Grand Trunk Pacific Railway, and on this site a depot has been established.

When work was begun, the spot was virgin forest, and it was necessary to remove the trees, terrace and level the ground, and build a sea wall along the face of the terrace before proceeding with the construction of buildings.

The contract called for: (a) the erection of a reinforced concrete wharf with timber approach trestle, together with the necessary dredging, earthwork, stone filling, pitching, concrete, timber and track work; (b) the erection of a buoy shed and machine shop, power house with reinforced concrete chimney, carbide store, store house, offices and dwellings, with all the necessary excavations, concrete, masonry, carpentry, plastering, plumbing, heating, electric wiring, painting and finishing; (c) the installation of drainage and water systems with dam and water tank, together with all the clearing, earthwork, pile driving, pipe laying and other necessary work; (d) the storage of machinery delivered by the Department and the erection of a travelling crane of 20 tons capacity.

Concrete piles seasoning

The buildings are neat structures of wood, and call for no particular comment. The machine shop will



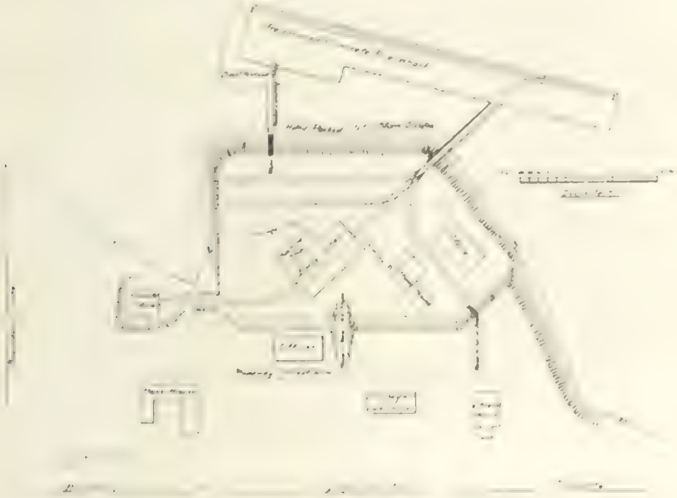
Panoramic view of greater part of depot

Steelwork of piles

Finished piles

contain such power tools as are required for repairing buoys, making small repairs to steamers, and such other odd work as is usual at a lighthouse and buoy depot. It is proposed, eventually, to instal steam power, but for the present power will be furnished by two 15 h.p. horizontal oil engines of special electric type.

The buoy shed is a building 80 ft. x 41 ft. and is equipped with a travelling crane of 20 tons capacity, carried on girders the whole length of the building. The front of the buoy shed is left open for convenience in handling the buoys, but they are kept under cover so that they may be worked at and painted during the wet season without lost time. A very complete trolley system leads from the wharf to the buoy shed, storehouse, carbide store, coal dump, etc.



General lay-out of station

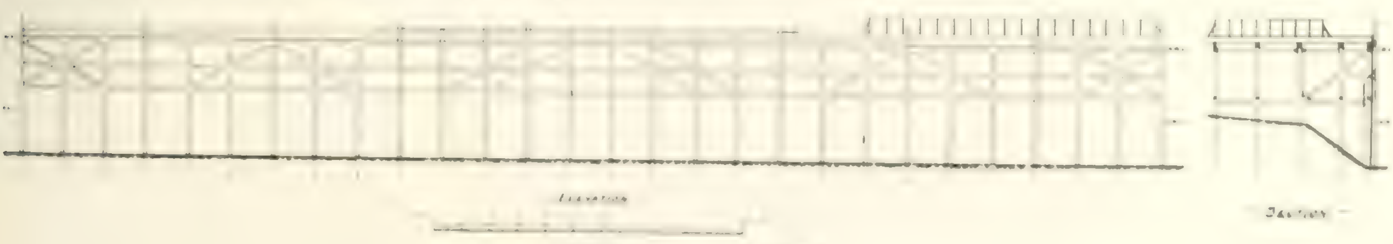
The most interesting detail in connection with this work is the wharf, 406 feet long and 43 feet wide, which is built of reinforced concrete piles, girders, joists and braces, with a plank deck on wooden stringers and joists. The reinforcing of the piles is a modification of the Hennebique system. They were made in moulds on the site and were allowed to season through the whole of the fine weather of summer. Full particulars as to dimensions and nature of construction are shown on the accompanying plans. The design was carefully prepared to suit local conditions, and feasibility of construction was constantly kept in mind. The rise and fall of the tide is large, and to avoid excessive work under water the piles were made heavy, the number reduced to a minimum, and all the tieing and bracing placed above low water mark. Great care was taken in placing the piles to have them absolutely perpendicular and in perfect line. This was accomplished by the contractors' erecting a substantial false-work to carry the pile-driver, which was specially constructed for the work. The piles were thus placed with mathematical accuracy, and the whole work reflects credit on the contractors, the Pacific Coast Construction Company, Victoria, B.C.

The contract was for a lump sum of $159,445, and Mr. F. P. Jennings of the regular staff of this office acted as resident engineer throughout the progress of the work. The concrete is completed and the wooden deck of the wharf is now being placed.

Editor's Note.—The following is the key to the panoramic protograph reproduced on the preceding page: A—Wireless Station on opposite side of bay; B—West end of city of Prince Rupert; C—Mount Hayes, behind Prince Rupert; D—Concrete piling of wharf under construction; E—Buoy shed; F—Offices; G—Concrete chimney of power plant; H—Engine house; J—Employees' boarding house; K—Dwelling for officer in charge; L—Construction sheds, to be removed.

Reporting on building conditions at Sydney, N.S., City Engineer Campbell states that prospects for the season are excellent, that plans are being prepared for several new business blocks and that house building will figure largely in the year's work.

A reinforced concrete motor boat has been built for service on the River Oder, in Germany. It is intended for pleasure trips and will run at a moderate speed, about 6 miles per hour. The boat measures 23 ft. overall.



Details of concrete wharf

Use and Selection of Building Materials

Influence upon Design—The Manner in which Each Material lends itself to Certain Architectural Forms

By Philip J. Turner, F.R.I.B.A., Lecturer in Construction, Department of Architecture, McGill University

By using suitable materials and treating them in the right and natural way, a building that is otherwise of only an indifferent design may be raised to a much higher standard than a neighboring one where neither the right materials nor the proper treatment of them has seemingly received any consideration. Generally speaking, common sense should play a large part in choosing what materials are suitable for a certain building under specified conditions, but as this quality is often lacking in those who build, one sees on all sides materials in positions which from their very nature they were never intended to occupy, or treated in a way that might be in keeping with almost any other materials than those with which they are placed.

How are we to impress upon a man without any aesthetic taste or sense of the beautiful that it is not necessary to have costly materials in order to make a building "look well," or to have, for example, a "nice smooth red pressed brick" front for his house, as if this were the one and only correct material to use? To define at length what materials are suitable and what are not, for certain positions, cannot be discussed in so short a paper as the present one. Even since commencing to write on this subject I have had to explain to a builder that "brick-tin" was most unsuitable as a covering for a picturesque country boarding-house! This he had considered a brilliant suggestion as a substitute for stained shingles, when the question of reducing the cost was being discussed. As will be readily understood, no hard and fast rules can be laid down, but we must study the nature and qualities of the materials around us before we can set up ourselves as experts, either as architects or contractors in the building world. Consider briefly what it is that gives so much pleasure and satisfaction in visiting and examining the buildings of bygone days. The very simplest cottage, as well as the most magnificent palace, charm us, and when we define the reason, we find it is not so much on account of an exceptionally good design, as that in every case the materials used in their erection have been properly selected and treated in the way most suited to them. The workman of mediaeval times was invariably a member of one of the many trade guilds of the day. He was apprenticed to his trade, studied and knew what the material he worked at was capable of doing, and used it accordingly. What is more charming than a half-timbered English country house? But its modern imitation is quite the reverse. In the former we have the timbers solid and used constructively with the face of the timbers left rough and the natural wood unpainted, or oiled only. In the present day such a design would invariably be carried out with 1½-inch boards stuck on—generally very palpable—and the face planed and painted.

Again, why are materials that are not natural to the locality used in a district? In our old examples, partly, no doubt, due to the fact that they had no means of transportation, only such materials were used as could be readily obtained, and consequently results seem always to have been satisfactory and to have blended with their surroundings. Now, however, we see stone used in brick districts, brick in stone and many other such anomalies, apparently for no other reason than that the owners like to be ostentatious and to show they have plenty of money to spend, instead of having a well-designed unobtrusive building in keeping with its surroundings.

Let us consider the common materials, such as stone, brick, iron and wood, under separate headings, and see how they may best be used. In each class will be found varying degrees of hardness of coarse and fine texture and other special characteristics, all of which rightly understood are guides to the true use and correct position of the material.

The fine and more delicate kinds are out of place where strength and hardness should be the primary consideration. Again, materials which can be cast in a mould should differ in form from those cut or shaped with tools.

Thus it will be seen that there are certain architectural forms suitable to each material and its varieties.

Stone

In the selection of the kind of stone to be used many details have to be considered. When the English Houses of Parliament were about to be built, in 1839, a commission was appointed by the government to select a stone suitable for so fine a building, which cost eventually something like $25,000,000. All the important stones in the Kingdom were examined and tested in a most exhaustive manner as regards their specific gravities, chemical analysis, etc.

The limestone selected, although it had been used in one of the large Yorkshire churches of the 11th century, and was almost as perfect as the day in which it was built, proved most unsatisfactory after a few years in the Palace at Westminster, London, owing to the fact that the sulphur fumes and other impurities in the London atmosphere soon decayed the stone. It now costs the British Government many thousands of dollars every year to use artificial means to preserve the stone.

In St. Paul's Cathedral, where Portland stone was used during its erection in the 17th century (this stone being practically the only one that successfully resists the atmosphere of the metropolis) we find that in this case the material has worn well and proved very satisfactory. On enquiring into the cause it will be learned that Sir Christopher Wren took the special precaution of not allowing a block of stone to be used unless the same had been quarried for twelve months. By so doing the stone had an opportunity to harden and season before being placed into the walls of the building.

In Montreal, a soft stone (Caen) was selected for Christ Church Cathedral. This is a well-designed building with stone spire; but the choice of material was an unhappy one, the same being quite unsuitable to resist this severe climate.

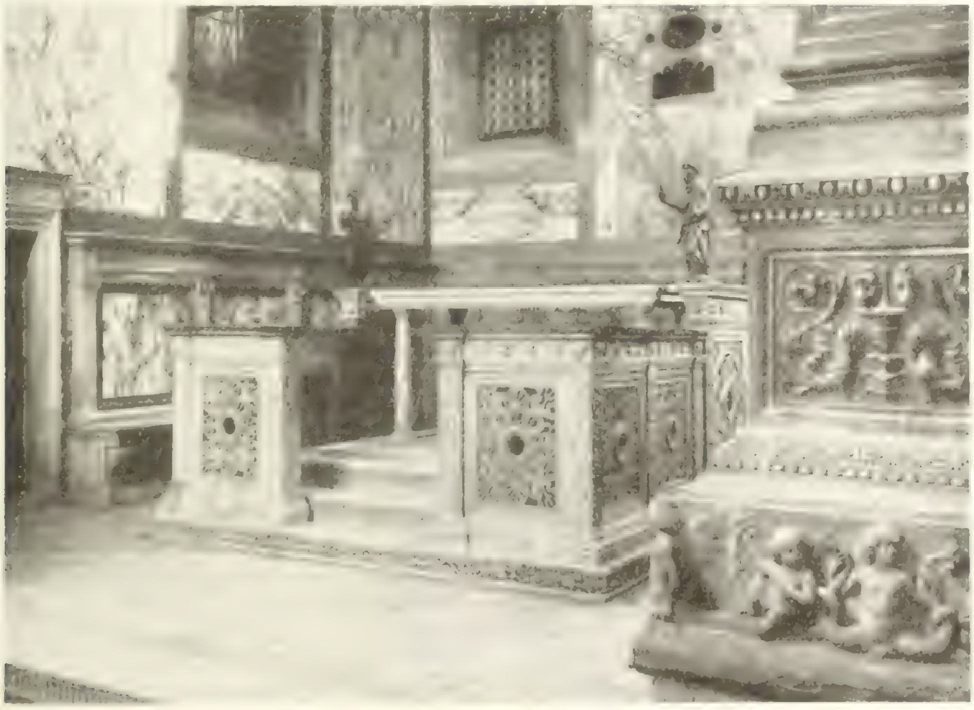
The innumerable variations in the characters of building stones makes the question of selecting the material for any given work, or, on the other hand, of adapting the work to the available material, one which requires frequent consideration. In every case, style and detail, craftsmanship and construction, must be adapted to the character of the material. If, for instance, it is tough and intractable, it would be absurd to adopt a style requiring the use of large quantities of wrought stone. If it is also without cleavage or distinct bedding planes even coursed rubble work might be out of the question. If the beds only run a few inches thick massive effects requiring large stones cannot be attempted.

If the stone is soft and perishable, close joints and smooth finish must be the rule, and every projection which might catch water must be avoided. If strings and hood moldings of a harder stone can be introduced to protect it so much the better, but it must be remembered that all arrises will soon lose their sharpness.

Grinling Gibbons, the famous carver of the 17th century, tried to undercut stone in the same way as his wonderful achievements in wood carving, but the material was not suited to such delicate forms, and he was doing violence to the true and essential qualities of the stone, which inevitably in course of time dropped to pieces.

If a coarse sandstone must be used, mouldings must be bold and large, if granite, the style must be broad and simple. There is a good example of this latter in the fine Bank of Commerce building on St. James street, Montreal. Here the Corinthian columns which are made up of drums 6 ft. or so in diameter and 65 ft. high, are of Stanstead granite. The caps themselves are carved as they should be in so hard a material, with the acanthus leaves merely shaped, and no attempt made to carve the smaller lobes on the over-turned leaf.

Marble, in its fulness of grain, is the exact opposite of granite and is capable of receiving the most delicate moldings and the most exquisite finish in carving. Where, however, the value of the marble lies in its figure or color, it is more appropriately used for decorative purposes in flat planes as best calculated to display its beauty. When for any special purpose such marble is moulded, large forms should be used, as the high lights which the smooth surface takes will disturb the figure.



Church of S. Maria dei Miracoli—The altar. Exemplifying the proper use of marble in three ways: (a) in wall slabs, where the figure of the marble is used as decoration, (b) in delicate carving work, (c) as inlay work

Wood

There are great varieties of timber used in this country, each with certain characteristics, which render it especially suitable for use in one building and unsuitable for another.

For timbers which are to be partly buried in the ground, a wood is required which is able to withstand the deteriorating effects of contact with the earth; and for this purpose cedar, cypress, redwood, or chestnut may be used.

For heavy framing, such as wooden trusses, girders and posts, a strong timber, and one which can be obtained in large long pieces, is required, and Georgia pine, Oregon pine, and white oak can all be used for such a purpose.

Cypress wood and cedar are best for shingles. For interior finish is chosen a wood which will make a pleasing appearance and which will take a polish, whilst for floors, hardness and resistance to wear are the further requirements. For floors, oak, hard pine, maple and beech are good, and for the rest of the interior finish any of the hardwoods such as ash, oak, mahogany, chestnut or butternut, are selected.

The toughness and density of wood must be considered in determining the character and size of the details and mouldings.

Hardwoods allow of sharp thin lines, and therefore of small and delicate mouldings, which would be impossible in a softer material. There are also certain kinds of wood as there are certain kinds of marble, the grain and figure of which is best reserved for decorative purposes and exhibited in boards and panels with simple forms and few mouldings. Timber is generally classified under the headings:—

(I) Soft or pine wood, and (II) hardwood or leafwood; these again being subdivided into a great number of varieties. The following principles might be given as a guide to the proper selection of wood:—

(I) Soft timber having straight grain with slight cohesion between the fibres should be used in straight pieces. Allowance should always be made for shrinkage; panels, for example, need freedom of movement to prevent splitting. Joiners' work should be made and lightly put together long before it is wanted and should only be glued up finally after the initial shrinkage has taken place.

In constructional work timber may be used under direct compression, tension or transverse stress, but it is not suited to resist shearing along the grain. Where this is unavoidable the joints must be very carefully made.

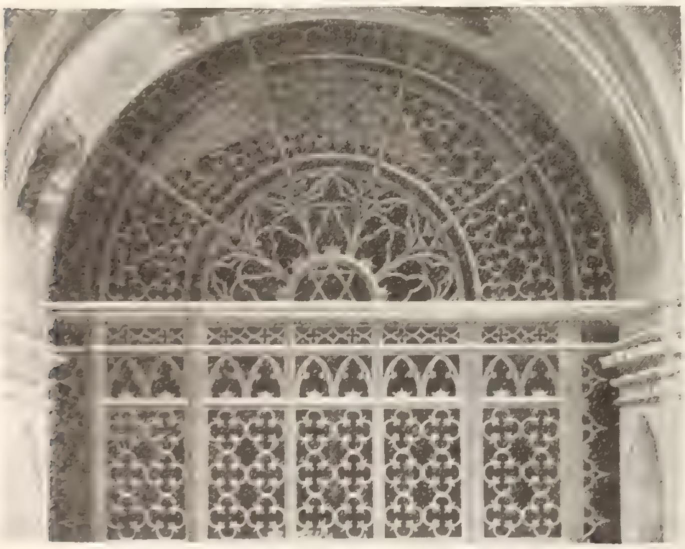
Mouldings should not be under-cut, nor should there be any other than simple carving in soft woods. All timber must be kept dry and well ventilated or else preserved by careful and frequent painting.

(II) Hardwood having much greater cohesion between the fibres than softwoods, may be used in curved as well as straight pieces. Shrinkage is complicated by the action of the medullary rays, but is generally less than in soft woods.

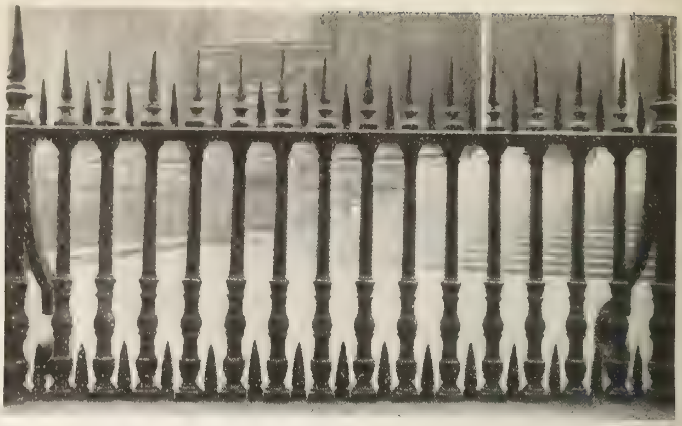
In constructional work hardwood should always be used where subject to shocks, as in warehouse doors and storey posts. Mouldings may be undercut, and carving may be rich and deep, there being ample cohesion to render this possible.

Metals

All metals should be used in accordance with natural characteristics. The several qualities of each metal must be recognized and used to the best advantage. In metals we have a new element to consider, which is, that they may be either "wrought" or "cast," and each kind has its appropriate form and position. In wrought work the metal is fibrous and elastic and can be drawn or beaten out, whereas cast work is brittle and granulated. In the one case it can be shaped into delicate and beautiful forms under the worker's hand, thus acquiring a distinctive quality of its own, while in the other the metal is poured into moulds in the form of cast work. In the latter case it should rightly and necessarily assume the more bulbous shapes, and being further removed from the human touch is for that reason of less interest and value than wrought work. All metals, it must be remembered, deteriorate more or less when exposed to the weather, especially iron, which corrodes quickly. It is absolutely necessary to protect metals by paint or other means. Iron railings which have been regularly painted for fifty years will often be found eaten away to a mere thread at the bottom where the moisture settles most.



Wrought iron work from Florence



Railing at St. Paul's Cathedral, London, Eng., illustrating the correct treatment of cast iron in this form

Metal in the form of iron is now used so much for constructional purposes that it is well to emphasize the following characteristics of (1) Cast; (2) wrought iron. Cast iron can be made into almost any conceivable form of which a pattern or mould can be made. It is more valuable in positions where continuous compression is to be resisted, but its resistance to tension is slight, as is also its resistance to shocks. It cannot be welded, rivetted or worked under the hammer and pieces can only be united by the use of screws, collars or bolts. It is much used for common gates and railings, but is very liable to break and is rarely used where special designs are required, owing to the heavy cost of preparing a pattern. Wrought iron would in such cases be cheaper and more durable.

Wrought iron can be cut twisted and bent in any direction, or hammered out flat, but it cannot be obtained in mass. It resists shocks admirably and is therefore most suitable for gates and railings, but on the other hand it rusts easily and should be kept well painted if used externally. It should not be used in contact with oak, the gallic acid in which attacks the metal, nor in conjunction with other metals, such as copper, because in presence of moisture a galvanic circuit would be completed.

Bricks

This subject was referred to by the present writer in the Special Brick Number of The Contract Record for December, 1911, but the following supplementary remarks may be added in connection with this subdivision:—Bricks when used with stone should always be accorded the less honorable part. It would not be correct, for example, to put brick quoins (viz.: corners or angles) to a stone building. There are hard and soft kinds of brick. Amongst the latter those known as "rubbers," which are used commonly for arches and architraves, being cut or rubbed to the required shape. Many beautiful examples of such work may be found, but the practice is not to be commended, for a sense of fitness teaches us that the stronger material should frame the softer, and a violation of the principle provokes a feeling of incongruity. Pleasing effects can be obtained by using different shades of brick. For example, a grey or purple brick for the quoins, arches and bands of a building used in conjunction with a red brick for the general surfaces of the wall makes a happy combination and gives interest to a building provided the contrast of color is not too marked. The tone or tint of brick walls used externally may be even or varied, and the texture fine or coarse, according to the varying natures of the brick. With a fine texture the tint should be even, and variety in tone will be pleasing if the texture is coarse.

The surface texture of a brick should give an idea of the material of which the wall is composed, and not merely that of a wash or shiny skin that may peel off some day.

Such a surface, though suitable in a whitewashed wall, or in a porcelain faced brick, is not the quality demanded in good characteristic brickwork. The size of the average brick is not the best for obtaining good effects and special bricks of thinner sizes can be obtained (such as the Roman brick 12-in. x 4-in. x 1½-in.). These, if used with a wider joint than is customary in the ordinary brick wall will give a more satisfactory appearance.

Good bricks are to be preferred to stone in some ways, as they are practically indestructible, either from the action of the weather, from the acids of the atmosphere or from fire. Brickwork is also cheaper than cutstone work in most localities, but, except in very dry soils it is not as suitable as stonework for foundations, nor can it be used for piers and columns, that carry heavy loads.

In conclusion, it is to be remembered that when selecting brick for a building one loses the monumental character that can be obtained in using large blocks of stone, but new elements of architectural effect are discovered that evolve themselves naturally out of the use of this universal building material.

(In a future article, concrete, terra cotta, roof coverings, glass, etc., will be discussed under this same heading).

Severe cracks developed in the exterior piers of a large reinforced concrete building during construction, which, according to the consulting engineers on the work, were due to a rather unusual cause. The building was 600 feet long, 60 feet wide and four storeys high, without an expansion joint, and the upper storeys were built mainly during the summer months. An investigation conducted subsequent to the appearance of the cracks showed that the piers at the centre of the building were perfectly sound, while with increasing distance from the centre the piers were more seriously affected, those at the ends of the building showing the greatest displacement. As this condition suggested that temperature expansion was responsible for the trouble, measurements were taken by plumbing down from the third floor level to the basement floor. These measurements showed that the third floor expanded, under the direct rays of the sun during a hot summer's day, a sufficient amount to swing the columns out from a perpendicular to an inclined position. The amount of this displacement, it is stated, was in some cases as high as 1½ inches at each end of the building.

The shape of sockets for tile pipe has been under discussion by the Institution of Municipal & County Engineers of Great Britain, and a standardization committee has drafted specifications which it is thought will produce a more desirable form of socket than is being used at present. The inside surface of the old socket is parallel to the bore of the pipe, so that when the joint is being made it is common for the workman to allow the spigots of the next pipe to rest upon the bottom of the sockets, thereby forming an obstructive lip in the line. The new type of socket has walls which flare out like the sides of a funnel, so that when the spigot of the adjacent pipe is introduced the two sections are lined up automatically and a true invert is secured. It is stated that the pushing home of the spigot always leaves a clear regular space all around for the jointing material, whereas with the old form of socket the space is frequently very irregular, rendering it difficult to properly fill the joints. Other advantages of the new joint are that less jointing material is required and there is less likelihood of its entering the pipe and forming an obstruction.

That heat is dissipated slowly from a manufacturing building is indicated in some figures obtained by a committee appointed by the Home Secretary of State of England to investigate the conditions in cotton mills of that country. On non-working days a shed was found to remain 8 to 10 deg. above the outside temperature. In all the weaving sheds the rise of temperature is rapid when the work commences in the morning, the average rate being 3 to 4 deg. per hour between 6 and 8 a.m.; 1.8 deg. per hour between 8.30 a.m. and 12.30 p.m. and 1.2 deg. per hour between 1.30 and 5.30 p.m. The maximum temperature, of course, occurs at the end of the working day. In the case of satisfactory construction the average increase is 15 to 20 deg., but 25 or 30 deg. have been recorded in some tests.

Since the discovery that frozen water pipes could be thawed out by passing a rather heavy current of electricity through them from the nearest electric light mains, this method has met with wide application. An electric light company of New York City has been kept very busy on this winter work, utilizing as many as five trucks equipped with the special apparatus required for the thawing work. Over four hundred cases, for the most part pipes under 1 in. in size, have been handled in a single week. The average time for the current to do its work has been about thirty minutes. Where a convenient connection can be made to the electric light main a water rheostat is employed to control the strength of current.

The new Woolworth Building at New York will be 55 storeys high and will be by far the tallest office building in the world. It will cost seven and a half million dollars, of which about three million dollars has been spent in the foundation. One of the engineers on the earlier stages of the work was Mr. R. E. Chadwick, formerly Bridge Engineer for the city of Toronto and now engineer for the Foundation Company, of Montreal.

C. P. R. Irrigation Projects in Alberta

Territory divided into Three Sections of about One Million Acres each — Detailed Description of Various Engineering Works

By A. S. Dawson, Chief Engineer, Department of Natural Resources,
Canadian Pacific Railway Company

SUPPLYING moisture to desert and semi-arid lands by artificial means is no new thing in the enterprises of civilization, and has been practised on one portion or another of the globe since the dawn of history. It was practised by the Egyptians, Arabians and Assyrians many centuries past; and history records that the flood waters of the Nile were used to irrigate its valleys many hundreds of years ago. The Romans operated vast systems which are in use at the present time, and the Chinese are credited with having put water on their rice lands by artificial means several centuries before the Christian era.

In America, this ancient art originated in prehistoric times with the Pueblo Indians who inhabited what are now portions of New Mexico and Arizona. Mormons settling on the shores of Great Salt Lake were the first English-speaking people to make a systematic application of the principles of irrigation in Western America, and this was shortly followed by the use of ditches in California, originally constructed for placer mining. The results obtained therefrom soon induced settlers in the States of Idaho, Washington, Oregon and Wyoming to resort to similar means in the cultivation of their crops. This was followed by large private enterprises and by the passing in 1902 of the Reclamation Act by the Government of the United States. This vast enterprise, under the direction of the Secretary of the Interior, has now either in operation or under construction projects involving an expenditure of over $60,000,000. The undertaking is to complete 35 projects, to serve 3,200,000 acres of land, at an estimated cost of $145,000,000.

Headworks of main canal—Western section C.P.R. irrigation block

The extent to which irrigation is practised to-day is oft-times overlooked, amounting as it does to fifty-three million acres in the Indian Empire, eight million acres in Egypt, five millions in Italy, three millions in Spain, and fifteen millions in the United States, with smaller areas in China, Japan, Australia, France, South America and elsewhere. The works providing for the irrigation of these vast areas represent an investment of over one billion dollars, and produce annually crops valued at over that amount.

Irrigation in Southern Alberta may be said to date from 1892, when a series of dry years turned the attention of the settlers to the possibility of aiding the growth of their crops by the artificial application of water. The question subsequently assumed such importance as to warrant its being taken up by the government, with the result that well-considered and comprehensive laws relating to the use of water for irrigation were passed; a system of general surveys was undertaken to determine the source and value of available supplies, and also the location of the areas where such water could be used to best advantage.

These surveys showed that three extensive areas offered special advantages for irrigation, one containing some 250,000 acres, situated in the Lethbridge district, which could be supplied from the St. Mary's river; a second containing about 350,000 acres lying near the junction of the Bow and Belly rivers, in Townships 11 to 14 inclusive, Ranges 11 to 16 inclusive; and a third, a much larger one, situated along the main line of the Canadian Pacific Railway, and extending about one hundred and fifty miles east of the city of Calgary. It is interesting to note that the works to serve all of these tracts have either been built or are now under construction. It is with the last mentioned project that this paper deals specifically.

This tract of land eventually passed into the hands of the Canadian Pacific Railway Company and is now known as the Bow Valley Irrigation Block. It was conceded that its development and colonization along proper lines would add materially to the selling prices of the land; that it would do away with the uncertainty of getting sufficient moisture for certain crops in certain years; that it would admit of intensive farming on smaller areas and result in settlers being attracted in larger numbers than could otherwise be expected. All of which are the bases of the revenue-producing value of any agricultural country as far as traffic receipts are concerned.

The Bow River heads in the Bow Lakes on the eastern slope of the Rocky Mountains and with its tributaries has a drainage area of about 3,800 square miles at Calgary, and about 5,100 square miles at Bassano. It generally reaches its highest stages between June 15th and August 15th of each year, and its lowest stages during January and February. Its maximum flood discharge at Calgary has probably been close to 100,000 second feet, although the hydrographic records for both extreme high and low water are rather meagre.

The Block is an open prairie plateau with a general elevation of about 3,350 feet above sea level at its westerly limits, sloping gradually until a general elevation of about 2,300 feet is reached at its easterly boundary. Its topography is rolling, particularly in the western portion, whereas large areas of almost level plains are found in its easterly limits. The soil is good, consisting of a heavy black

10-foot timber drop—Western section C.P.R. irrigation block loam and clay subsoil in the westerly portions and a lighter sandy loam of great depth overlying clay and hard pan in its easterly limits.

It is bounded on the west by the fifth Meridian; on the south by the Bow River; on the east by the line between Ranges 10 and 11, west of the Fourth Meridian; and on the north by the Red Deer River and the north boundary of Township 28. Its length east and west is about one hundred and forty miles, and it has an average width north and south of about forty miles. It is intersected by the main line of the railway company, and numerous other railway facilities are being provided in various directions. It contains an area of 4,840 square miles, or 3,097,580 acres.

The precipitation varies considerably from year to year and decreases easterly as the altitude becomes lower. Meteorological records only exist subsequent to 1886, and are applicable only to the westerly portion of the Block. The average annual precipitation at Calgary between 1886 and 1910 was 15.15 inches, the minimum for the same period being 5.90 inches in 1889 and the maximum 31.90 inches in 1902. The average for the irrigation period of five months, from May 1st to October 1st, covering the same years, was about 11 inches.

This moisture, however, is not always available when most needed, and it is a recognized fact that without irrigation certain crops cannot be raised to advantage; and that in any year the certainty of crop production with large yield can only be assured by artificial means.

Surveys in connection with the project were commenced by the Railway Company in 1903 and have been gradually extended in detail since that date. This represented a vast amount of work, as an irrigation project demands surveys and examinations far more complete than those for a railway line. Elevation is the controlling feature and lateral extent or width of country is as important as length. Width, length and height have all to be considered. Accurate topographical surveys have been carried on by plane-table methods over practically the whole Block at an average cost of about ten cents per acre, on which the complete system has been projected.

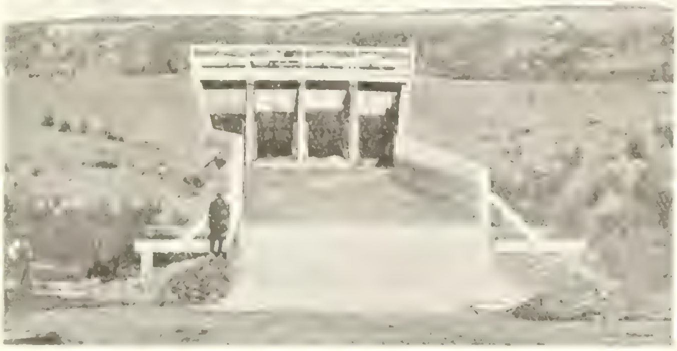
On completion of the preliminary surveys it became evident that the Block divided itself naturally into three sections, which were designated as the Western, Eastern and Central, of about one million acres each. The work is being carried on along the lines of development in the order named. The Western and Eastern sections are complete units in themselves, whereas the Central section, owing to its general elevation, could only be served by an enlargement of the trunk lines in the Western Section.

Western Section

The Western Section comprises an area of 1,039,620 acres, of which about 370,000 acres have been brought under ditch. Construction was commenced in 1903 and completed in 1910 and water was first used in 1907. Water for this section is diverted from the Bow River at a point near the present easterly limits of the city of Calgary. The head works are of timber, and are well protected by a pile and timber wall along the river bank, extending 350 feet above and 1,400 feet below the structure. Their sill elevation is 3,353, and they consist of twenty openings, three feet wide and ten feet high, subject to side and top contractions. The gates are wood, of the straight lift type, and are operated by rack and pinion through a triple reduction gear with power ratio of 100 to 1 arranged on a movable winch mounted on a travelling truck. It is the intention to replace this structure in the near future with permanent works and at the same time to build a collapsible dam in the river which will admit of obtaining the full head of about ten feet required, during all stages of the river.

Main canal "A" heads at this structure, its capacity being 2,000 cubic feet per second at full supply of ten feet. Its section varies to suit conditions, its maximum section being 60 feet bed width, 120 feet at the water level, with 3 to 1 slopes, and a grade of .01 per cent. Throughout the greater portion of its length its dimensions are 44 feet bed width, 84 feet on the water line, with 2 to 1 slopes, and a grade of .02 per cent., which, with an assumed value of "n-.025" gives a calculated discharge of 2,050 cubic feet per second. At a point about two and a half miles below the headgates, this canal was crowded close to the river banks by heavy excavation, and at this point a set of escape or regulating gates was provided with a sill elevation one foot below canal grade. This structure is of timber, and consists of four openings 6 feet by 11 feet, each controlled by wooden gates. These are known as balanced pressure gates and are so designed that they will rise of their own accord when the head against them is about five feet. Each consists of a rectangular barrier working freely between parallel walls without guides. Each gate is hinged to four long arms, arranged in pairs, the location of the hinges being so chosen that the weight of the gate is balanced by any required pressure. They are made practically watertight by rubber flashings, and are lifted by an ordinary chain windlass, provided with haul and brake.

At a point about 15 miles below the headgates, the main canal makes a vertical drop of ten feet, where an important timber structure was built. The excessive velocity resulting from this drop was taken care of by the contraction of the opening above to twenty-five feet, and by a water cushion five feet below, with an enlargement of the opening to forty-three feet terminating in wings. Piling was extensively used in this and all other important structures built in the early stages of the project.


Timber spillway, main canal—Western section C.P.R. irrigation block

About two miles beyond this point, or seventeen miles from the headgates, this canal terminates in Reservoir No. 1, which, however, is in reality only a balancing pool with slight storage for sudden drafts of water, thus relieving the secondary canals from small fluctuations in head. The reservoir referred to, which is about three miles long and half a mile wide, was formed by the building of an earth dam 2,000 feet long, faced with heavy rip-rap on the water side. From this reservoir the water is taken out in three secondary canals, known as "A," "B" and "C," having a combined length of about 250 miles. These are each controlled by timber headgates with sill elevation of 3,321.50, and are of a type similar to those described in connection with the main canal spillway. Numerous large structures are located on all of the secondary canals, including headgates, drops, flumes and bridges.

Secondary Canal "A" heads out from the south end of Reservoir No. 1, and Secondary Canals "B" and "C" together are taken out at the north end. Secondary Canal "A" at its outlet is 18 feet bed width, carrying 8 feet of water, with 2 to 1 slopes, on a grade of .03 per cent. It drops twice to cross the railroad, and about fifteen miles from its head again drops about thirty feet and expands into what is known as Reservoir No. 2, at which point its section was changed on account of grade to 22 feet bed width, carrying 6 feet of water, with 2 to 1 slopes, on a grade of .035 per cent. About thirty miles beyond, near Strathmore, it again drops and crosses the railway line, splitting into a North and a South Branch. North "A" is 10 feet bed width, carrying 3.2 feet of water, with 1 to 1 slope, on a grade .06 per cent. South "A" is 18 feet bed width, carrying 4½ feet of water, with 2 to 1 slopes, on a grade of .04 per cent. Both continue easterly to the vicinity of Gleichen, covering lands to the Crowfoot Creek at an elevation of about 2,970.

Secondary Canals "B" and "C" together utilize a natural channel for three miles from the north end of Reservoir No. 1, and there divide, "B" turning easterly and "C" northerly. "B" is 28 feet bed width, carrying 6 feet of water, with 2 to 1 slopes on a grade of .025 per cent., continuing for four miles to split gates dividing it into a north and a south branch. "C" is 40 feet bed width, carrying 6.4 feet of water, with 1½ to 1 slopes, on a grade of .03 per cent., and serves all the land lying between the Rosebud River and the Serviceberry Creek. At a point about eight miles from its upper end it splits into an East Branch—which is 37 feet bed width, carrying 5 feet of water, with 1½ to 1 slopes, on a grade of .035 per cent.—and a West Branch, which is 12½ feet bed width, carrying 5.7 feet of water, with 1½ to 1 slopes, on a grade of .04 per cent. The East Branch utilizes about ten miles of natural channel, in which 175 feet of grade is disposed of. The West Branch crosses the valley of the Crowfoot Creek by a wood stave pipe siphon of 53 inches internal diameter and 1,600 feet long, working under a maximum head of 52 feet, in which 8 feet of grade is used up.

10-foot reinforced concrete drop—Western section C.P.R. irrigation block

Exclusive of the main canal, Secondary Canal "B" North Branch is the most important waterway in the Western Section, as it is intended ultimately to be used for the main supply channel to the Central Section of the Block. After leaving the junction of its North and South Branches, it follows a natural channel for about 16 miles, this channel being straightened in places by artificial cut-offs. In this distance it falls about 250 feet, the elevation of the split gates being 3,248 and of the headgates at the lower end of the natural channel, known as Weed Creek, being 3,031. At the dam on this channel the canal heads out 18 feet bed width, carrying 4½ feet of water, with 2 to 1 slopes, on a grade of .045 per cent., and extends a distance of 14 miles to a summit with an elevation of 2,998. Before crossing this summit one branch is taken off to serve lands in the vicinity of the south branch of the Crowfoot Creek. After crossing the summit it again splits, the main branch continuing on the north side of an elevated ridge until Summit Lake is reached, which is the controlling point for the Central Section of the Block, and where a broad low valley of about elevation 2,884 will be crossed by a siphon.

From the secondary canals the water is again taken out and distributed through a comprehensive system of distributing ditches, which bring it to each parcel of land to be served.

In the Western Section of the Block the following mileage of canals has been constructed:—Main Canal, 17 miles; Secondary Canals, 254 miles; Distributing Ditches, 1,329 miles; a total of 1,600 miles, and in addition there are several hundred miles of small ditches constructed by the farmers.

The structures, consisting of headgates, spillways, drops, flumes, bridges, etc., are numbered in thousands. In their construction ten million feet board measure of timber and over four thousand cubic yards of reinforced concrete were used.

In constructing the system in the Western Section over ten million cubic yards of material was excavated. Practically all the work was carried out under contract, at prices ranging from 12½ cents to 43 cents per cubic yard, the latter price including overhaul on the heavy work. The average price was about 17½ cents per yard. The cost of timber work in place has been slightly over $55 per thousand feet, and of reinforced concrete about $23 per cubic yard, both figures including all material used, as well as excavation, trenching and backfilling.

Central Section

This section contains 901,740 acres. It was at first contemplated to irrigate about one-quarter of this area. Detailed surveys, however, showed that the cost of serving such an area would be excessive and at present it is not contemplated to serve more than about 75,000 acres in this section, with an elevation at its westerly boundary of about 2,940.

As previously intimated, this section only could be reached through an enlargement of a portion of the trunk system already constructed to serve the Western Section of the Block. Due consideration has been given this matter wherever possible by spreading double banks far enough apart to admit of carrying the additional amount of water which will be required. Up to date the construction of this portion of the system has not been started.

Eastern Section

The Eastern Section of the block contains 1,156,220 acres, of which 440,000 acres are to be rendered irrigable. Most of the land is of a gently rolling character and is susceptible of good drainage. The soil for the most part is a rich sandy loam overlying hard pan and shale at various depths.

An idea of the peculiar topographical conditions existing in this Section is necessary before the scheme as worked out can be understood. The main watershed of the country between the Bow River and the Red Deer River starts, as far as this section of the Block is concerned, at a point on the Bow River locally known as the Horseshoe Bend, about three miles southwest of Bassano, a station on the main line of the Canadian Pacific Railway, 83 miles east from Calgary. It parallels the river for a few miles to near the southeast corner of Township 18, Range 17, West Fourth Meridian, from which point it runs almost due east to a point three miles southeast of Brooks station, thence northeasterly to Tide Lake in Township 19, Range 11. At the Horseshoe Bend the ridge is cut across by a wide valley, which apparently is an old river channel, the summit of which is only 95 feet above the river bed and about 600 feet from the same. A stream known as the Mat-zi-win Creek has its source in the valley above referred to, and this is the natural boundary between the lands served by the two main branches of the system.

This project as outlined from the surveys takes advantage of a low pass in the watershed to take water from the Bow River by an intake located at the Horseshoe Bend. A dam which is being built across the river at this point performs two functions. First, it will raise the water level at the intake, thus enabling the system to command a much larger area of land than it otherwise would have done; and secondly, it reduces the quantity of material to be removed from the main canal heading at the dam. At this point the ordinary low water level elevation is 2,515. The elevation of the canal headgates will be 2,549.6, and the normal depth of water in the pool will be 11 feet higher, or 2,560.6. The dam is to be a composite structure, consisting of a long and high earthen embankment on the west bank of the river and a reinforced concrete spillway in the existing river channel, connected at its easterly end with the canal headgates. Just above the site of the dam the river makes a long bend, in the shape of a horseshoe, which gives the locality its name, the dam being located at its toe. At this point the river is approximately 600 feet wide, its north or left bank having a narrow bench immediately at the water's edge and only a few feet above it, beyond which is a cut bank rising over one hundred feet above the bed of the stream. The west or right bank has a gravel beach rising gradually until it forms a tongue between the two legs of the horseshoe. This tongue has a broad flat top several hundred feet in width and rising gradually to the general prairie level, its general elevation near the river being about 25 feet above the bed of the stream.

On this tongue an earth dam to which the spillway structure will be joined, is now under construction. This embankment will have a maximum height of about 45 feet, a total length of about 7,000 feet, and at its highest point is 310 feet in width at the base. Its wetted slope is 4 to 1 and its dry slope 3 to 1, the top width being 32 feet, with a free board of 9 feet above normal water level. Provision has been made for under-drainage by a wooden box filled with boulders and gravel with suitable offtakes, and its upper slope will be paved with concrete slabs. It will contain about one million cubic yards, which material is being transported from the excavation from the main canal, across the river over a double track timber trestle. The foundations of this dam consist of a deposit of river silt overlying coarse gravel and boulders, which in turn overlie dense blue clay.

Reinforced concrete headgates and spillway, on secondary canal system—Western section C.P.R. irrigation block

The spillway is designed to pass over its crest 100,000 second feet without raising the surface of the pool above elevation 2,563.6 or 14 feet over the crest, which required a free length of weir of about 600 feet. To allow for end contraction, on account of the piers necessary to support the movable crest, a clear length of 650 feet between piers was decided on.

As the crest of the dam and the sills of the canal headgates were fixed at elevation 2,549.6, the additional depth of 11 feet, for which the canal was designed, had to be maintained by some form of moveable crest for the entire length of the spillway in order to pass extreme floods. This moveable crest will be divided into twenty-four sections, supported between piers giving 27 feet clear spans, and these openings will be regulated by structural steel gates, of the well-known "Stoney" type. In the determination of the spacing of the buttresses, due consideration was given to the effect upon cost of construction, the time required to build the structure, and to the limitation in length of the gates corresponding to the spacing of the buttresses, with the result that these are to be at 15 feet centres, with every second buttress carried up in the form of a bridge pier. Emergency gates will also be provided in case of necessary repairs having to be made to the main gates.

53-inch wood stave siphon—Western section C.P.R. irrigation block

The spillway proper is a reinforced concrete structure of the so-called "Ambursen" type, consisting of a heavy floor built upon the bed of the stream. Upon this floor are erected parallel buttresses, of substantially triangular outline, having a slope on the upstream edge of about 45 degrees. Upon brackets or haunches projecting from the faces of the buttresses and parallel to the upstream edges there is built a concrete slab forming a deck, terminating at the top of the buttresses in a curved crest and passing down over the downstream edge of the buttresses in the form of an apron, suitably curved to correspond as nearly as possible to the path of the overfall flood waters. In front of the dam the floor is being carried downstream a distance of about 75 feet, forming a tumbling hearth. In general, the cross-section of the spillway is what is known as the Ogee section and consists of constructing the downstream face of the dam between the crest and the floor in the form of a reverse curve, the lower edge of this curve being tangential to the floor of the structure, so that the overfalling nappe shall be let down the face of the dam and turned into a horizontal direction parallel to the river bed with the least possible disturbance. The spillway is founded on a deposit of sand, gravel and boulders overlying a thick stratum of stiff blue clay.

At the upper and downstream edges of the structure heavy cut-off walls are carried well down into the clay and are bonded to the body of the carpet. A concrete apron carried about 12 feet above the upper cut-off wall, and boulder concrete will be placed in the river bed for some distance below the tumbling hearth.

The structure is to be 720 feet in length between abutments, with maximum height of 40 feet to the overflow crest, above which 11 feet of water will be retained by the gates above referred to. It will contain about 40,000 cubic yards of concrete and two and a half million pounds of reinforcing steel. The abutments connecting the spillway with the earth dam are in the form of reinforced concrete retaining walls of the "Counterfort" type, with a view of cutting off all possibility of leakage at this point. Provision has also been made for a road bridge on top of the structure. The gates will be operated by a small power plant consisting of vertical turbines with direct connected generators installed inside the dam for this purpose, as well as for lighting and the operation of other headgates at the end of the main canal about five miles distant. The canal headgates will form an integral part of the structure at its easterly end, and will consist of five openings each of 20 feet, controlled by "Stoney" sluices. These gates will control the discharge through a main canal of 90 feet bed width, carrying 11 feet of water, with 1 to 1 slopes, on a grade of .016 per cent. This canal is designed to discharge 3,800 cubic feet per second, and has a summit cut of 55 feet at about Station 10.

The contract for the spillway structure was let on October 1st, 1910, and work was started immediately, it being anticipated that it would be completed within eighteen months from that date. The earthen embankment referred to is part of a very large contract awarded in June, 1910, which includes the handling of about twenty million cubic yards of excavation in this Section of the Block.

At a point about five miles from the intake, an earth dam, 1,280 feet in length, 35 feet maximum height, containing 80,000 cubic yards, was built across the valley, thus forming a tail pool into which the main canal will discharge. This dam has a top width of 12 feet, six feet above high water, has 2 to 1 slopes on the rear face and 3 to 1 on the wetted slope. Its face is paved with heavy rip-rap, well bedded in gravel.

From this point two canals head—a North and an East Branch. The North Branch with its distributaries will water about 90,000 acres, its dimensions being 29 feet bed width, carrying 6½ feet of water, with 2 to 1 slopes, on a grade of .03 per cent. After crossing the railway line about one mile east of Bassano, its location follows the west flank of a deep valley known as Crawling Valley. At a point about eight miles from its intake it drops 18 feet and crosses the valley by about 1,700 feet of flume, and runs northerly, gradually reducing in size until it reaches the Red Deer slope.

The East Branch, like the North Branch, heads out in the tail pool of the main canal, its size at the outlet being 68 feet bed width, carrying 9.3 feet of water, with 2 to 1 slopes, on a grade of .015 per cent. Near Lathom the first branch takes off, dropping 25 feet to cross the railway and water an area of about 107,000 acres between the Mat-zi-win and the One Tree Creeks, This branch is known as the Spring Hill Canal and is about 35 feet bed width, carrying 7 feet of water, with 2 to 1 slopes, on a grade of .025 per cent. The East Branch continues southeasterly along the northerly flank of the watershed as a 45.3 in. by 7.8 ft. canal with a grade of .02 per cent., reaching the height of land at the head of Antelope Creek, which is crossed by a flume 2,200 feet long with a maximum height of 22 feet. At this point it again forks, the southeasterly branch being known as the Bow Slope Canal, which is about 17 feet bed width, carrying 5 feet of water, and will serve all the land on the Bow River Slope of the divide and lying west of the Rolling Hills, amounting to about 42,000 acres.

At Cassils a smaller canal to cross the railway is taken off, to serve about 12,500 acres; and just south of Brooks the East Branch discharges its waters with a drop of about 17 feet into Lake Newell Reservoir, which will be formed in a depression in the Little Rolling Hills by the construction of a number of earth dams, the largest of which will be about 2,000 feet long and 30 feet in height. This reservoir will be about 9 miles long and 4½ miles wide, and its storage capacity will be about 186,000 acre feet. It will be filled each season after the close of the irrigation period, and was the means of materially reducing the cost per acre of the project as a whole.

A tract of about 50,000 acres south of the reservoir will be served by a canal heading out at the south end. This will be known as the Rolling Hills canal, of about 19 feet bed width, carrying 5½ feet of water, on a grade of .02 per cent.

The outlet from the north end of the reservoir will serve about 118,000 acres, known as the Bantry system. Its dimensions are 44 feet bed width, carrying 7.7 feet of water, on a grade of .01 per cent., and about five miles in length. At its easterly end it will discharge into a reinforced concrete flume 10,500 feet in length, with a maximum height of 54 feet and a sectional area of 129 square feet.

Considerations of storage values fixed the elevation of both ends of this structure. Under these conditions the type of crossing which gave the highest velocity for a given fixed friction head was imperative.

Numerous preliminary studies were made for the purpose of comparative estimates of cost, with the result that a somewhat unique design is likely to be adopted. The actual channel is of the suspended type commonly used in steel flumes. The exact section proposed is the elastic curve or hydrostatic catenary. For the purpose of a flume this curve has the advantage that it is the equilibrium polygon for a liquid filling it to the chord of the arc; the tension is everywhere the same; and there is neither moment nor shear at any point. When the structure runs partially full, there are both moment and shear, and these are the factors which fixed the thickness of the shell. The substructures of the flume will vary with the head, and it is

Excavation of main canal—Eastern section C.P.R. irrigation block probable that a multi-arched design will be adopted, with spans varying from 30 to 100 feet. For the depressed portion under the railway line it is intended to use a reinforced concrete siphon, and in order to save excavation and provide means of measuring the discharge it is proposed to form a Venturi meter with a throat section of about 6 feet. The structure as a whole will probably contain about 25,000 cubic yards of concrete and upwards of two million pounds of reinforcing steel. This flume will carry the water over a broad divide in the watershed, with its summit at a point about three miles southeast of Brooks, and will serve all the country east of that point.

At the easterly end of the flume the canal section is 44 feet bed width, carrying 7.7 feet of water, on a grade of .01 per cent., and in N. E. quarter of section 23, Township 18, Range 14, it splits, one branch of 37½ feet bed width, carrying 7.2 feet of water, on a grade of .01 per cent. running north; and another branch of about 16 feet bed width, carrying 5 feet of water, on a grade of .01 per cent., running east and again crossing the railway line.

In section 14, Township 19, Range 13, the northerly branch again splits into two canals, each about 20 feet bed width, carrying 5½ feet of water, on grades of .01 per cent., one branch serving the north and the other the south slope of the watershed. The estimated mileage of canals and ditches to serve this section of the block is as follows:—Main canal, 5 miles; secondary canals, 475 miles; distributing ditches, 2020 miles; total 2,500 miles. The structures numbering thousands, will include drops, headgates, flumes, siphons and bridges, and to a large extent will be built of reinforced concrete and brick.

The different cross sections of canals and ditches are modified to suit conditions, such as discharge, available grade, nature of soil, and transverse slops of the country. On ditches 2½ ft. by 1 ft. to 3½ ft. by 2 ft., 1 to 1 slopes are used, and on ditches 4 ft. by 2 ft. to 4½ ft. by 3 ft., 1½ to 1 slopes are standard, with banks 3 feet wide on top and one foot above water level. On small ditches no dependence is placed on banks as part of the canal prism unless the grade is one foot below the under side of the sod, or about 1½ ft. cut on an average. On larger ditches on level ground the area of the water prism is generally about the cube of the depth, the banks being half the depth of water above water level, with a maximum of 3 feet, and a width equal to the depth of water on the upper side, and 12 feet on the lower side, where a roadway is required. Where the depth of water is over about 5 feet, 2 to 1 slopes are standard, although this is changed to 1½ to 1 where extreme cross slope exists. Where the depth of water is less than 5 feet 1½ to 1 slopes are standard under ordinary conditions. Endeavors are made to balance cut and fill, with an allowance of about 15 per cent. for shrinkage, unless it happens that shorter locations with heavy cutting through a ridge would result in a reduction in quantities.

The grades are so selected as to give a uniform velocity of about 2½ feet per second and not to exceed 3 feet per second, consideration being given to the character of the soil and the depth of water in the ditch.

Where the slope of the country is so great that the velocity would be too high if the canal were given a bed slope to correspond therewith, the excess fall is concentrated by vertical drops. Where such drops occur too close to one another for safety or economy, a short section of flume or lined channel is employed for the purpose of overcoming the excessive grade.

Losses by seepage and evaporation are allowed for as follows:—

In preliminary projection:

Canals 2 to 100 sec. feet, 1 per cent. per mile; canals 100 to 500 feet, .5 per cent. per mile; canals 500 to 1000 sec. feet, .25 per cent. per mile; canals 1000 and over sec. feet, .10 per cent. per mile.

Alignment.—Curvature is carefully considered and on the larger canals curves are regularly run in with transit and chain, the radius allowed on the larger secondary and branch canals being between 15 and 30 times the depth of water. On smaller distributing ditches a radius 6 to 8 times the depth of water, with a minimum of about 10 feet, is aimed at. As far as possible the land lines are adhered to in laying out the distribution system.

Horse Shoe Bend dam -Eastern section C.P.R. irrigation block

Tail Channels.—At each point where water is divided by a branch gate, an alternative path is provided to carry off tail water to some drainage channel, the capacity of these tail channels bearing a constant proportionate relation to that of the various irrigation ditches above them. In no case is this less than 2 second feet, and otherwise is 25 per cent. of the capacity of the canal or ditch just above. These tails are located on the land lines as far as possible; otherwise they are made to reach the drainage channels by the shortest possible route.

Cross Drainage is provided for in three ways: (1) it is taken under the canal; (2) if small in extent of catchment area, it is taken into the canal system by an inlet; (3) it is carried over the canal. The type of crossing adopted depends to a large extent on the importance of the drainage line, on the character of the climate and to some extent on the size of the canal. No definite rules can be laid down to meet all cases, but as a rule the cross drainage is handled in the order referred to above.

with due consideration of cost. The material chiefly used in connection with smaller under crossings has been corrugated metal culverts, up to 36 inches in diameter, manufactured from [illegible] Ingot Iron and Toncon Metal. For larger structures reinforced concrete pipe and arch culverts will be used.

Flooded areas are avoided by the use of double fills or levees, combined with means of taking care of the cross drainage.

Spillway or escape channels, with the necessary structures on the canal system, are provided at frequent intervals, averaging about 6 miles where possible, on all secondary and branch canals, their capacity being at least 10 per cent. and not exceeding 25 per cent. of the canal in which they head.

Overhaul is calculated by the well-known methods of Mass Curve, the limit of free haul being 100 feet parallel to the canal axis. In case of borrow pits not on the ordinary cross section, the length of haul is measured in a straight line between the centres of gravity of cut and fill.

Excavations.—Necessary waste is used to widen the banks uniformly and to strengthen the higher fills. Borrowing, where necessary, is done by (1) deepening the canal; (2) widening it; and (3) both if required. If none is practicable, borrow pits are made well away from the canal on the high side and so arranged as to drain into the canal. Where side borrow is absolutely necessary, a barn equal to at least the height of the bank is left between the tow of the bank and the edge of the borrow pit.

Embankments are in all cases put up with material from adjacent cuttings, or from borrow pits if the former is unsuitable or deficient in quantity. In determining the outer slope, the plane of saturation is considered as sloping from high water level at the rate of 3½ to 1. This plane is not allowed to intersect the outer slope or to approach the toe nearer than 10 per cent. of the base width. In very high fills, where the above requirements lead to excessive material, the slope of saturation is increased by draining the rear or outer half of the embankment, or by constructing the first three feet of the outer third of the bank with sand, gravel or other porous material.

Stripping and Bonding.—The under surface of embankments is bonded when the head against the banks is 2 feet or more, and less than half the top width, providing two furrows and one additional furrow for each extra two feet, with one furrow just inside the upper or wet toe, one under the centre, and the balance if any, between them. The surface is stripped when the depth against the bank exceeds half its top width; when the cross slope exceeds 1 to 6; in boggy ground; or when the soil exceeds plow depth. The surface is bonded and stripped when the head against the bank exceeds 10 feet; when the surface is hard and dry after stripping; or when the cross slope exceeds 1 in 4. The width of stripping is determined by the plan of saturation above referred to.

Rotation of supply.—This portion of the system is being designed with a view of rotation in supply being adopted, which will result in each individual farmer obtaining a satisfactory head; a fair division of water; and simplification of operating problems. This is a matter which cannot be worked out in detail until the lands are settled, but the system is being designed on the basis of giving parcels of between 80 and 160 acres a supply of 2 second feet for a period of 96 hours, and parcels smaller than 80 acres a similar flow for 48 hours.

It is the intention that daily records of the receipt and delivery of water and of the outflow through all branches of the system shall be maintained from the beginning, such data being as necessary in irrigation management as in book-keeping—in any commercial institution. The information thus obtained is essential in enforcing proper water economy; in preventing land from being injured; and in keeping farmers from getting into bad habits in using water, which if once acquired, result in reduced crop production, increased cost of operation and needless annoyance to the management.

World-wide experience in the use of water on cultivated lands under any kind of crops during long periods of years, shows that the duty varies with, (1) the nature of the soil; (2) the age of the soil; (3) the kind of crop; (4) the weather conditions; (5) the slope and condition of the conveying channels of supply; (6) the distance the water is carried in the ditches and channels to the fields; and (7) the experience and skill employed in irrigation. The legal duty in the Province of Alberta is fixed by the Irrigation Act as a continuous flow of one cubic foot per second per 150 acres for 153 days between May 1st and September 30th. Measurement of this supply is arranged for by weirs approved of by the Commissioner of Irrigation.

The company has adopted the plan of constructing the complete distribution system so as to deliver water at the boundary of each farm unit of 160 acres or less, as it was considered impracticable to leave to the settlers the building of the smaller ditches, which would have resulted in delays to the work, excessive cost, and a retarding of the development of the area, followed by increased difficulties in operation. In constructing the distribution system, 160 acres has been considered the farm unit, although in the Western Section several Colonies have been established on the so-called "ready-made" farms of 80 acres. In the Eastern Section of the Block about 5 per cent. of the farm units will be sold as 80-acre farms, in addition to the establishment of a number of colonies on farms averaging from 80 acres to 120 acres.

The successful outcome of any large irrigation project is only partially solved by good construction. In some cases the administrative heads of large schemes have failed to realize that the ultimate success of such enterprises cannot be fully brought about without farmers and that it is their labors that fully determine the real value of such properties. With this realization the sale of the lands in this Block warranted the establishment of a very large organization which has extended over all important points in Canada, the United States, Great Britain and parts of Continental Europe. This organization has resulted during the past five years in the disposal of over 1,300,000 acres.

Everything that follows in the wake of increased population is an argument in favor of irrigation and the cultivation of small areas which can only be carried out by this means of farming. Moreover, this results in a better type of farmer, greatly improved living conditions and correspondingly elevated social conditions. No practical agriculturist can fail to realize the fact that the scope for irrigation in semi-arid conditions in Northern latitudes is very great and that this system of farming will ultimately become a leading factor and occupy a vitally important place in the agricultural development of Southern Alberta.

Messrs. J. J. O'Gara & Company, architects, Calgary, have opened an office at Cranbrook, B.C., with Mr. J. F. O'Gara in charge.

There is likely to be keen rivalry in the competition for designs for the new Technical High School, Toronto, upwards of forty applications for the terms of the contest having been received from members of the profession. The competition closes on June 15. The judges are Principal McKay, Mr. Percy E. Nobbs, of Montreal, and Mr. A. F. Wickson, of Toronto.

Excellent Progress at Nanaimo, B. C.

The city of Nanaimo, B.C., which is known as the Coal City—coal having been first mined there by an Indian in 1852—has made rapid improvements in the last two years. The present population is 8,000. In 1909 there was no sewerage system and only about two miles of cement sidewalks. In the previous year, however, steps had been taken to improve the water-supply.

The first work taken up by the present City Engineer, Mr. Allan Waters, on his appointment was the preparation of a sewerage scheme. The separate system was adopted with two main outfalls into the harbor. The scheme was approved by the provincial authorities. The work has been carried out both by contract and day labor —the outfalls by the latter. The total estimated cost is $300,000 and up to the present time seven miles of sewers have been laid, this comprising about two-thirds of the system. The question of the collection and disposal of garbage is now under consideration.

In addition to the two miles of sidewalks existing in 1909, there are now eleven miles. The average cost of construction, including grading, outside of the business streets has been $2.38 per square yard. In the immediate city it was necessary to construct reinforced concrete retaining walls and make special provisions before laying sidewalks, owing to the large amount of fills and old disused mining shafts, and the cost has been relatively higher.

Cement Dam at Nanaimo, B.C., built at a cost of $26,000

Quite recently the main business streets have been paved with asphalt.

The building permits which in 1910 were to the value of $120,000, increased in 1911 to $160,000.

In 1910 a concrete dam was constructed to impound 13,000,000 gallons of water.

In October, 1910, it was decided to replace the timber dam at the service reservoir with a concrete one, considerably heightened, to increase the capacity from 8,000,000 to 13,000,000 gallons. The dam was built of concrete, the proportions used being 2½ gravel, 1½ sand to 1 cement. With each batch was added one bag of hydrate of lime. On the up and down stream faces of the dam, stout wire mesh reinforcement was used, this being placed 2½ inches from the surface. A screening chamber with an 18-in. diameter outlet was provided, also a 24-in. diameter washout. Although the dam was under construction in the winter months, the work is excellent.

The principal water-supply is derived from the South Forks of the Nanaimo River, about twelve miles distant, by means of a large timber dam, a 14-in. wire wound wood pipe conveying the water into the service reservoir. The work necessitated the construction of several trestle bridges and one suspension bridge. The original scheme for the work was prepared by [illegible] of Vancouver.

The extensions of the water mains during 1911 amounted to 14,000 feet, whilst the number of connections were double that of the previous year.

This year it is proposed to complete the sewerage, to increase from 12 in. to 18 in. the main water service conduit into the city, to heighten the dam at the headworks, to construct a concrete bridge and approaches over an inlet of the harbor and to lay ten miles of concrete sidewalks. The city has also applied for a charter for a street railway system.

Municipal Work at Saskatoon

The municipal works to be undertaken this year by the Engineering Department of the city of Saskatoon, under City Engineer Clark, will cost approximately $1,200,000. Contracts for the various works have been awarded as follows: Messrs. Hoy & Elzy Company, St. Paul, extensions to pumping plant, $50,000; Western Pavers Limited, Winnipeg, concrete sidewalks, $110,000; Robinson & Foster, Spokane, concrete sidewalks, $50,000; Robinson & Foster, Spokane, substructure 23rd street subway, $55,000; Bitulithic & Contracting, Ltd., Winnipeg, bitulithic pavement, $190,000; El Oso Paving Company, Vancouver, sheet asphalt and asphaltic Paving Company, Vancouver, sheet asphalt and asphaltic concrete, $175,000; Dominion Bridge Company, Montreal, superstructure 19th St. subway, $15,600; Canada Iron Corporation, Montreal, cast iron pipe, $72,200; Drummond McCall & Company, Montreal, valves and hydrants, $10,700; Western Foundry, Saskatoon, manhole frames and covers, $4,500; H. Mueller Manufacturing Company, Decatur, Ill., corporation brass, $3,000; Jas. Robertson Company, Winnipeg, lead and iron pipe and service boxes, $8,500. The estimated value of sewer pipe (contract to be let) is $30,000; of labor on thirteen miles of sanitary sewers and water mains, $150,000; of labor on storm sewers, $40,000; of labor on sewer and water connections, $60,000; of sand stone paving, $115,000; of superstructure, etc., 23rd street subway, $40,000. In addition, the Saskatoon Street Railway Company will construct eleven miles of street railway, and an additional $175,000 will be spent on the light and power station.

The Vancouver City Council is considering the question of bridges in which the Canadian Pacific is particularly interested, and seven plans have been submitted for Carral street. The cost of the structures varies from $200,000 to $350,000. It is understood that the C.P.R., although willing to provide land for the approaches so far as they are in a position to do so, are not prepared to pay any share of the cost of the undertaking. Nothing has yet been decided in the matter, the plans being still under the consideration of the council

The City Engineers of the Dominion

Nova Scotia

New Brunswick

Quebec

Ontario

Manitoba

Saskatchewan

Alberta

British Columbia

A "Who's Who" of the Canadian Municipal Engineering Profession

WITH a view to furnishing our readers with a ready reference to the Canadian municipal engineering profession, we have collated the biographical matter presented in the following pages. The sketches are intended primarily as a reference to professional experience, and as such, we believe, in their comparative brevity they will be of the most direct value to those who consult them. The coats-of-arms reproduced herewith will doubtless be of additional interest. If in a few cases it should lead to the adoption of new designs, the innovation would be still further justified. The engineers of the cities detailed hereunder by provinces are featured as nearly as practicable in the order given below:

Nova Scotia.—Halifax, Mr. F. W. W. Doane; Sydney, Mr. D. McD. Campbell.

New Brunswick.—Fredericton, Mr. J. L. Feeney; Moncton, Mr. J. Edington; St. John, Mr. W. F. Murdoch.

Quebec.—Hull, Mr. J. P. A. Laforest; Montreal, Mr. Geo. Janin; Sherbrooke, Mr. T. Tremblay; St. Lambert, Mr. A. S. Dickison; Westmount, Mr. A. Currie.

Ontario.—Belleville, Mr. J. G. Lindsay; Brantford, Mr. T. H. Jones; Fort William, Mr. John Wilson; Galt, Mr. E. O. Fuce; Guelph, Mr. J. T. Hutcheon; Hamilton, Mr. A. F. Macallum; Kingston, Mr. R. J. McClelland; London, Mr. G. W. Wright; Oshawa, Mr. F. Chappell; Ottawa, Mr. N. J. Ker; Port Arthur, Mr. L. M. Jones; St. Catharines, Mr. R. D. Brown; Stratford, Mr. M. Ferguson; St. Thomas, Mr. Mason H. Baker; Toronto, Mr. C. H. Rust; Windsor, Mr. M. E. Brian.

Manitoba.—St. Boniface, Mr. M. P. Blair; Winnipeg, Mr. H. N. Ruttan.

Saskatchewan.—Prince Albert, Mr. F. A. Creighton; Moose Jaw, Mr. J. Antonisen; Regina, Mr. L. A. Thornton; Saskatoon, Mr. G. T. Clark.

Alberta.—Calgary, Mr. J. T. Child; Edmonton, Mr. J. Latornell; Lethbridge, Mr. A. C. D. Blanchard; Medicine Hat, Mr. A. K. Grimmer.

British Columbia.—Fernie, Mr. R. Potter; Nanaimo, Mr. A. Waters; New Westminster, Mr. J. W. B. Blackman; North Vancouver, Mr. G. S. Hanes; Prince Rupert, Mr. W. M. Davis; Vancouver, Mr. F. L. Fellowes; Victoria, Mr. Angus Smith.

Mr. F. W. W. Doane, Halifax, N.S.

Mr. F. W. W. Doane, City Engineer of Halifax, N.S., made his first connection with engineering work at the age of nineteen years, when upon leaving school, he entered the service of the Provincial Government of Nova Scotia as junior assistant to Dr. Martin Murphy, Provincial Engineer. Mr. Doane worked under Dr. Murphy for over eight years, passing through the different grades to the position of Chief Assistant. Mr. Doane's varied experience in provincial work included railway surveying and construction, land surveying, water supply, sewerage, laying out construction and repair of public roads, reclamation of land from the sea, and construction and maintenance of highway bridges. An idea of the magnitude of the latter work may be gained from the fact that Mr. Doane was concerned with works which involved an expenditure of $1,100,000. In railway work he served in all ranks, reaching the position of Engineer-in-Charge. In 1886 he was leveller on the Musquodoboit Valley and Stewiacke Railway; in 1889, levelman and transitman on the Carlton Branch Railway and Western Shore Railway; in 1890, Engineer-in-Charge on the North Colchester Railway, and Heatherton & Guysboro Railway—all in Nova Scotia.

Mr. Doane was appointed City Engineer of Halifax in 1891. He is a member of the Canadian Society of Civil Engineers, and also of the Faculty of Pure and Applied Science of Dalhousie University. He was one of the organizers of the Nova Scotia Society of Engineers, and has been prominently identified with the Union of Nova Scotia Municipalities since its organization. He was president of the Nova Scotia Institute of Science in 1906 and 1907, and has been a member of the Council of that body since 1888. As an officer in the Canadian Militia he has a long and distinguished record.

Mr. D. McD. Campbell, Sydney, N.S.

Mr. D. McD. Campbell, City Engineer of Sydney, N.S., was born at Salmon River on November 1st, 1878. He was educated at Truro Academy and entered Dalhousie College in 1894, from which he graduated with the degree of Bachelor of Arts in 1898 and Bachelor of Science in 1900. In his science course he devoted his studies to civil engineering, taking honors in pure and applied mathematics. He was granted the degree of M.A. in 1904 for further work in mathematics. Mr. Campbell's professional career was commenced immediately after graduation, when he entered the service of the city of Sydney as assistant engineer. During his tenure of office a complete sewerage system has been built for the city and an extensive water improvement scheme carried out. Mr. Campbell was appointed City Engineer in June, 1908.

Mr. J. L. Feeney, Fredericton, N.B.

Mr. John L. Feeney, B.Sc., City Engineer of Fredericton, N.B., is a native of that city and received his early education at the High School there. Afterwards he proceeded to the University of New Brunswick, from which, in 1910, he graduated in civil engineering. In 1907 and 1908 he acted as assistant city engineer during his vacations. During 1909 and until his appointment as City Engineer in May, 1910, he had charge of the water and filtration plant. During the spring of 1910 he took a special course of instruction in Boston and New York studying the system of mechanical water filtration, and also bacteriology.

Mr. J. Edington, Moncton, N.B.

The City Engineer of Moncton was born in Ayrshire, Scotland, in 1854, and was educated at various high schools

HALIFAX, N. S.

Mr. F. W. W. Doane

SYDNEY, N. S.

Mr. D. McD. Campbell

FREDERICTON, N. B.

Mr. J. L. Feeney

ST. JOHN, N. B.

Mr. W. F. Murdoch

MONCTON, N. B.

Mr. J. Edington

HULL, QUE.

Mr. J. P. A. Laforest

and at the Athenaeum Institute of Technology in the city of Glasgow. For five years he was a student and for two years assistant engineer with Messrs. Storey & Smith, civil and mining engineers of Glasgow. Later he acted as resident engineer on construction work for various British engineering firms, the projects with which he was connected being mainly waterworks and sewerage systems. He had charge of considerable underground surveying in the Cleveland Iron District in England. His last connection with the old country was as resident engineer on the installation of a waterworks system for Lanark. This work included storage reservoir, service reservoir, leading and distributing mains. In 1883 he came to Canada as engineer for the Moncton Gas, Light and Water Co., for whom he installed an electric light and power plant in addition to important extensions. Mr. Edington was appointed City Engineer of Moncton in 1895.

Mr. William Murdoch, St. John, N.B.

Mr. William Murdoch, City Engineer of St. John, N.B., was born at Paisley, Scotland, on April 16, 1848. Six years later he was brought by his parents to St. John. He was educated at the Grammer School at St. John and afterwards, while serving an apprenticeship in a foundry, studied his profession with Mr. Robert C. Minnette. ex-City Surveyor. On the completion of the apprenticeship, and at the age of twenty years, he obtained a position in the office of the Sewerage and Water Commission. In 1869, Mr. Murdoch was appointed Assistant Engineer. He retained this post until 1894, when, on the death of the superintendent, he was appointed to the higher position. In the year 1906 he was made executive head of the department, with the title of Director and Superintendent. Mr. Murdoch's appointment to the position of City Engineer was made in 1909.

Mr. J. P. A. Laforest, Hull, Que.

City Engineer Laforest, of Hull, was appointed to his present office about a year ago in succession to Mr. Dosithe Chene. During the last few years Mr. Laforest has had extended experience in municipal and public works. He prepared plans and superintended the construction of the Joliette waterworks and sewer systems and also had charge of similar work for Levis, Montmorency, Cap St. Ignace, Bienville, Lauzon, Victoriaville, and Megantic. Mr. Laforest was for some time in the employ of the National Transcontinental Railway and was formerly district engineer at Montreal for the Marine Department.

Mr. Georges Janin, Montreal, Que.

Mr. Georges Janin, general municipal engineer for the city of Montreal, was born at Poicters, France, in 1853, and came to Canada in 1892. One of his earliest interests in this country was the protection of running waters from sewage pollution. In his official reports he emphasized the necessity for introducing the system followed in Europe and the United States. Mr. Janin outlined his views on this subject at a conference held in Montreal in 1896, and received the support of the Provincial Board of Health. The St. Laurent College subsequently authorized Mr. Janin to undertake a sewage farm scheme, and after his first experiment the city of Montreal entrusted him with a similar enterprise to utilize the sewage of St. Denis Ward.

In 1898 Mr. Janin entered the service of the city as acting superintendent of the aqueduct system, during the illness of the superintendent at that time. He was afterwards appointed assistant superintendent, finally assuming the direction of the Water Department. The Provincial Board of Health also appointed him consulting engineer.

Mr. Janin has been identified closely with practically all the important works carried out in Montreal in recent years. Of these perhaps the extension of the waterworks is the most noteworthy.

Mr. Thos. Tremblay, Sherbrooke, Que.

Mr. Thomas Tremblay, City Engineer of Sherbrooke, Que., has held his present position since 1898, when he was appointed city engineer and superintendent of the waterworks. Previously Mr. Tremblay had an office as Land Surveyor and Civil Engineer in the city of Sherbrooke. When Mr. Tremblay first opened his office in Sherbrooke, in 1892, the population of the city was 9,000. To-day it is 18,000, and the city is still growing very rapidly. In municipal development provision is being made for a population of 50,000.

Mr. A. S. Dickison, St. Lambert, Que.

Mr. A. S. Dickison, who was appointed Town Engineer of St. Lambert, Que., rather more than a year ago, was born in New Brunswick, at Fredericton, where he graduated as a civil engineer, after which he took a post-graduate course at Cornell. His first professional engagement was in railway construction work. He next became City Engineer of Westbrook, Maine. Following this he was appointed superintendent of an extensive steel works, now a branch of the United States Steel Company. On the completion of this engagement he opened an office of his own and did considerable work for the United States Government as a consulting engineer and inspector of warships. Just before returning to Canada, two years ago, Mr. Dickison installed a 250-ton refrigerator plant at Baltimore, Maryland, and a 70-ton plant near Philadelphia, Pa.

Mr. Dickison is an expert in industrial plants, having been engaged for fifteen years in their construction and operation, and he is a specialist in refrigeration, the operation of gas engines and the manufacture of abrasives, his experience in these special lines in the United States having been very extensive. The equipment of an "abrasives" plant for the John Cowan Company, Limited, of Montreal, was carried out under his direction.

Mr. Archibald Currie, Westmount, Que.

The present City Engineer of Westmount was born in Glasgow 43 years ago and was educated in that city and at the West of Scotland Technical College, graduating in 1890. For three years he was assistant engineer with Sir John Aird & Sons, contractors, in London. He then accepted an engagement with the Chinese Government as resident engineer in charge of important engineering works in the north of China. When Admiral Sir Edward Seymour made his famous attempt to relieve the European legations in Pekin in 1900, at the time of the Boxer uprising, Mr. Currie was his chief engineer. For his services in this connection Mr. Currie received a medal and clasps.

Later Mr. Currie went to South Africa and remained there for nine years, six of which he spent in Johannesburg, where he was in charge of electric railway, drainage and road construction. Upon returning to Great Britain Mr. Currie engaged as consulting engineer on water supply works and similar enterprises in Ireland, Scotland and Wales. Coming to Canada a year or so ago he was appointed early in 1911 to succeed Mr. F. L. Fellowes, now City Engineer of Vancouver.

Mr. J. G. Lindsay, Belleville, Ont.

Mr. James Gray Lindsay, City Engineer of Belleville, Ont., was born in Belfast, Ireland, in 1870. His early training was received from Mr. J. J. McDonnell, C.E., J.P., of Belfast, Ireland. After serving his articles, Mr. Lindsay held several appointments previous to commencing practice in the year 1895.

The City Engineer of Belleville has had a great deal of experience in various parts of the world. He held an engagement with the contractors on the Belfast Main Drainage Scheme, a project involving an expenditure of £300,000. He has acted for the British Government in the West Indies,

MONTREAL, QUE.

SHERBROOKE, QUE.

ST. LAMBERT, QUE.

Mr. G. Janin

Mr. T. Tremblay

Mr. A. S. Dickison

WESTMOUNT, QUE.

BRANTFORD, ONT.

BELLEVILLE, ONT.

Mr. A. Currie

Mr. T. Harry Jones

Mr. J. G. Lindsay

and was afterwards offered the position of Colonial Engineer on the Gold Coast of West Africa, which, however, he declined owing to climate.

Mr. [illegible] is a member of the Ulster Society of Architects, an association which is in alliance with the Royal Institute of Architects of Great Britain.

Mr. T. H. Jones, Brantford, Ont.

Mr. T. Harry Jones is an old Brantford boy, having been born in that city in the year 1856. He graduated in civil engineering at McGill University in 1877. Among his classmates at that time were Messrs. P. D. Ross, R. B. Rogers, Willis Chipman and the late W. McLea Walbank.

In 1878, Mr. Jones was admitted to practice as a Provincial and Dominion Land Surveyor. In 1880 he formed a partnership with Mr. F. H. Lynch-Staunton, of Hamilton, and for two years was engaged in Government surveys in the Northwest. In 1883 he began the practice of surveying and engineering in the city of Brantford, acting as city engineer, and as engineer for several townships in the County of Brant. In 1893 he was appointed City Engineer of Brantford.

As City Engineer, Mr. Jones had charge of the construction and extension of the Brantford waterworks and sewerage systems. Some 14 years ago, Mr. Jones designed and constructed extensive flood prevention works in the city of Brantford, including the widening and deepening of the river channel, the lengthening of the bridges, the construction of a sluiceway dam, and the building of about three miles of dykes. Mr. M. J. Butler, C.M.G., formerly Deputy Minister and Chief Engineer of Railways and Canals, was consulting engineer on this work.

Mr. Jones has been engaged as engineer in arbitrations for the corporations of Brockville, Peterborough, Guelph and Stratford, and by the Ontario Government as commissioner for the purpose of making a survey of Burlington Beach and the adjustment of the respective rights of the settlers and the city of Hamilton. He is a member of the Canadian Society of Civil Engineers and one of the charter members and past presidents of the Association of Ontario Land Surveyors.

That the City Engineer of Brantford is imbued with the military spirit is not surprising, his grandfather having fought at Queenston Heights and his father having been adjutant in the Gore Militia. While at McGill, Mr. Jones was a member of the University Company of the Prince of Wales' Rifles. In 1883 he took a three months' course in the military school at London, Ont., there obtaining a first class certificate. He joined the Dufferin Rifles of Canada during the same year, and rose to the rank of senior major in that battalion, retiring in 1894 with this rank. On the organization of the Corps of Guides, Mr. Jones was appointed Sub-District Intelligence Officer, serving for five years in that corps with the rank of captain.

Mr. John Wilson, Fort William, Ont.

Mr. John Wilson, City Engineer of Fort William, is a native of Lanarkshire, Scotland, and is 32 years of age. He was educated at Glasgow and the West of Scotland Technical College and was apprenticed to Messrs. Wm. Robertson & Son, Glasgow, civil and mining engineers, from 1897 to 1904, during the latter period of which time he was resident engineer at the lead mine at Strontian, Argyleshire. Coming to Canada in his early twenties he made connections with the C. P. R. as transitman on maintenance of way between Winnipeg and Fort William. He was engaged upon the latter work from 1904 to 1906, securing an appointment in the latter year as assistant to City Engineer Hancock of Fort William. Mr. Wilson was appointed to his present position in January, 1912.

Mr. E. O. Fuce, Galt, Ont.

Mr. Edward O. Fuce, Town Engineer of Galt, Ont., was born in Kent County, Ont., in 1882. After a preliminary course in the public schools he attended the Chatham Collegiate Institute for three years and in 1900 matriculated from the Jarvis Street Collegiate, Toronto. Mr. Fuce entered the University of Toronto (Faculty of Applied Science) in the fall of 1900 and graduated with honors in 1903. His first professional experience was obtained with Mr. W. M. Davis, C.E., then of Berlin, Ont., but now City Engineer of Prince Rupert, B.C. During his connection with Mr. Davis he was engaged on general municipal and street railway work.

In June, 1904, Mr. Fuce became resident engineer of the Galt sewerage system and he conducted a branch office in Galt for Mr. Davis until August, 1907. Of the various work which came under the supervision of Mr. Fuce during that time may be mentioned sewer construction in Galt, costing approximately $250,000; sewage disposal system, $20,000, and a bridge on the Grand River, $12,000. Mr. Fuce also had charge of the Preston waterworks system and of the preliminary work for the Preston sewerage system. In August, 1907, Mr. Fuce was appointed engineer of the Galt sewerage system. He was appointed town engineer of Galt in 1910.

In addition to his work at Galt, Ont., Mr. Fuce is engineer for the townships of McKillop, Tuckersmith, Colborne, Wawanosh, Beverly and North Dumfries. He is an Ontario Land Surveyor and associate member of the Canadian Society of Civil Engineers.

Mr. James Hutcheon, Guelph, Ont.

Mr. James Hutcheon, City Engineer of Guelph, Ont., who is a native of Nassagaweya, Halton County, Ont., graduated from the School of Practical Science, Toronto, in 1890. Subsequently he qualified as an Ontario Land Surveyor, and took up survey work in New Ontario. For some time he practised under the direction of the late Mr. W. R. Burke, of Ingersoll. Later he joined the staff of Mr. C. H. Keefer, and obtained much useful engineering experience, notably in bridge work. In 1893 he accepted the position of City Engineer of Guelph, retaining the post until May, 1906, when he resigned in order to take up private work. For the better part of three years Mr. Hutcheon was engaged upon government surveys in New Ontario, along the line of the National Transcontinental Railway. In the spring of 1909 he resumed his former connection with the city as City Engineer.

Mr. A. F. Macallum, C.E., Hamilton, Ont.

Mr. Andrew F. Macallum, C.E., is a graduate of the School of Practical Science of the University of Toronto, obtaining the degree of B.A.Sc., in 1894. In addition, Mr. Macallum holds the professional degree of C. E. He is a member of the Canadian Society of Civil Engineers and of the Engineers' Club of Toronto.

From the outset of his career Mr. Macallum has been connected with responsible projects. He was engineer-in-charge of the waterworks at Midland, Grimsby and Bridgeburg, and of sewers at Midland. From the office of the late Mr. W. T. Jennings, at that time City Engineer of Toronto, Mr. Macallum was in 1893 appointed assistant to the York County Engineer.

As a consulting engineer Mr. Macallum made an enviable reputation. A few of the undertakings upon which he has been engaged to report and estimate include: viaduct for Toronto, Bracebridge & Trading Lake Railway; eastern entrance, railways, Toronto; entrance of electric railways, Hamilton; Chicago & Milwaukee Electric Railway; Windsor, Essex & Lake Shore Railway. He was consulting engineer for West Toronto, and arbitration engineer

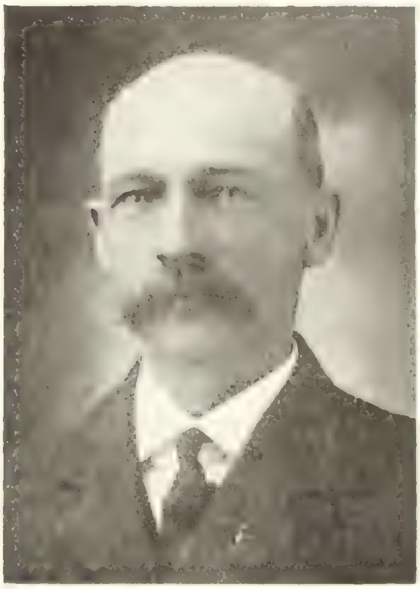
FORT WILLIAM, ONT.

Mr. Jno. Wilson

GALT, ONT.

Mr. E. O. Fuce

GUELPH, ONT.



Mr. J. T. Hutcheon

KINGSTON, ONT.

Mr. R. J. McClelland

HAMILTON, ONT.

Mr. A. F. Macallum

LONDON, ONT.

Mr. G. W. Wright

on the Canadian Northern Railway. Mr. Macallum was at one time called to Alaska in the interests of the Alaska Central Railway. Another specialty of Hamilton's City Engineer is water power. Mr. Macallum has made reports in connection with power development on the Ottawa, Seine, Madawaska, Black, Grand and York Rivers, and on the Welland and DesJardines canals.

In railroad work, also, Mr. Macallum has had extensive experience, having been resident engineer for the Toronto, Hamilton & Buffalo Railway, Minneapolis & St. Louis Railway, Chicago & Great Western Railway, and for the reconstruction of the C. P. R. at Ottawa. He was also chief engineer of the Nipissing & Northern Railway; Hamilton, Grimsby & Beamsville Railway, and Great North-West Central Railway, and division engineer of the Transcontinental.

Mr. Macallum was appointed to his present position early in 1909.

Mr. R. J. McClelland, Kingston, Ont.

Mr. R. J. McClelland was born and educated in Kingston. In 1902 he was appointed chief clerk in the City Engineer's office. Three years later he became Assistant City Engineer and from May to September, 1906, Acting City Engineer. Later Mr. McClelland was transit man on the revision of the Grand Trunk Railway line between Kingston Mills and Collins Bay for the city of Kingston. From 1907 to 1909 he was Town Engineer of Gananoque. He was Acting City Engineer of Kingston from September 15 to December 18, 1911, the latter being the date of his appointment to his present position.

Mr. G. W. Wright, London, Ont.

The Engineer of the Forest City graduated from the School of Practical Science in 1907 and held a fellowship in the University of Toronto in 1909. After a summer's experience as draughtsman with the Canadian Northern Railway he spent three and a half years with the Grand Trunk Railway as engineer on maintenance of way, supervising general track work, yard layout and the completion of the Paris end of the grade separation between Brantford and Paris. After spending two or three years as foreman in municipal contracting he obtained a position in the Works Department at Toronto under Mr. C. H. Rust, remaining there for three years, at the end of which period he was appointed Deputy City Engineer of London, succeeding to his present position on the resignation of Mr. A. O. Graydon in 1910.

Mr. Frank Chappell, Oshawa, Ont.

The Town Engineer of Oshawa, Ont., is a native of Cardiff, Wales. After completing a five years' apprenticeship course in the workshop and offices of the Mercantile Pontoon Company, ship builders and repairers, of Cardiff, and winning a scholarship, he began a course of study in civil and municipal engineering at the University of South Wales, from which he graduated in 1907. Coming to Canada he entered the employ of the Grand Trunk Railway Company at Montreal. In 1908 he attended McGill University, Department of Surveying, and later he took up postgraduate work in municipal engineering at McGill. After completing this course he engaged in work in a private capacity until in June, 1909, he was appointed town engineer and superintendent of waterworks at Oshawa, Ont.

Mr. N. J. Ker, Ottawa, Ont.

Mr. Newton James Ker was born at Brantford, Ont., on May 6th, 1866, and was educated at the Brantford Collegiate Institute, after which he entered the office of his uncle, Mr. P. A. Peterson, at that time chief engineer of the Canadian Pacific Railway at Montreal.

The first work of importance with which Mr. Ker was connected was the construction of the Canadian Pacific Railway into Montreal from Lachine to Windsor street. He was then engaged upon the Canadian Pacific Railway Esplanade entrance into Toronto; the construction of the Canadian Pacific Railway bridge over the Thames at London, Ont., under Mr. W. T. Jennings, C.E.; the Detroit extension at Windsor, having charge of that section running out of Windsor, and subsequently of the division between Windsor and Chatham, under Mr. Malcolm H. McLeod, C.E.

Mr. Ker was on his way to accept a position on the Virginia, Roanoke and Ironton Railway, Virginia, when he was offered a position by Mr. Jennings, then City Engineer of Toronto. His first work in Toronto was in connection with the arbitration between the city and the old Toronto Street Railway Company. Subsequently he had charge of the reconstruction of the system from a horse-car to an electric system, acting as engineer for both the Toronto Railway Company and the city of Toronto. During his ten years' service in the City Engineer's office at Toronto, Mr. Ker filled the position of engineer in charge of roadways, engineer in charge of sewers, assistant engineer on waterworks, engineer in charge of the Queen street subway and Island survey, lake under current observation, chart of Toronto Bay, and many other works of importance.

In 1899 Mr. Ker was appointed Assistant City Engineer of Ottawa, and engineer in charge of the main drainage system, a work which was built within the estimated cost of $500,000. He was appointed City Engineer in 1900.

Mr. L. M. Jones, Port Arthur, Ont.

Port Arthur's City Engineer was born at Dowlais, in Wales, and was educated at Cardiff. His professional career commenced in July, 1899, when he became identified with C.P.R. construction at Winnipeg, working in the capacities of chainman, rodman, draughtsman, etc., until August, 1903, when he entered the employ of Messrs. Barnett McQueen Company laying out the foundations of the Canadian Northern elevator at Port Arthur. He was afterwards employed by Mr. Jno. Woodman, consulting engineer at Winnipeg, as inspector on the Broadway Bridge across the Red River and also on the construction of the Winnipeg and Selkirk Railway. At this time he carried out a considerable amount of work for the Winnipeg Electric Railway, laying out track work, designing and building three car barns and new gas works. He also had charge of the construction of the hydro-electric sub-station on Portage avenue East. In March 1906. Mr. Jones took charge of a survey party for the C.P.R. maintenance of way department. In the following June he was appointed Assistant City Engineer of Port Arthur, retaining the position until April, 1909, when he accepted an appointment with Messrs. Smith, Kerry & Chace, Toronto. He returned to Port Arthur in March, 1910, as Assistant City Engineer, and was appointed City Engineer on June 1, 1911.

Mr. R. D. Brown, St. Catharines, Ont.

Mr. Robert Dunlop Brown, A. M. Inst. C. E., received his early training in the Borough Engineer's office at Clydebank, Scotland. After four years in Clydebank, Mr. Brown spent seven years as assistant to the City Engineer of Glasgow, and was employed under Mr. W. C. Easton, B.Sc., M. Inst. C. E., Engineer on Construction for the Glasgow Main Drainage Works for the purification of the River Clyde. These works, which took about ten years to complete, and cost a colossal sum of money, involved almost every phase of engineering, and Mr. Brown was engaged upon such works as tunnels in compressed air with shields, pumping stations, deep foundation work in quicksand, purification works, etc.

Leaving corporation service to take up an appointment with the Considere Construction Company, Limited, of

OSHAWA, ONT.

Mr. F. Chappell

OTTAWA, ONT.

Mr. Newton J. Ker

PORT ARTHUR, ONT.

Mr. L. M. Jones

ST. CATHARINES, ONT.

Mr. R. D. Brown

STRATFORD, ONT.

Mr. M. Ferguson

ST. THOMAS, ONT.

Mr. Maurice H. Baker

[illegible] Mr. Brown spent a year on reinforced concrete work and was responsible for the Dunblane bridge [illegible] over the Allan water and a steamboat wharf on an exposed part of the coast. On the completion of these contracts he came to Canada, and after a few months under the City Engineer of Toronto on flood relief problems, received his present appointment to St. Catharines.

In addition to his connection with the Institution of Civil Engineers, Mr. Brown is also an Associate Member of the Institution of Municipal Engineers (London, Eng.), the Geological Society and the Sanitary Association of Scotland. He served two years as member of council of the Glasgow Association of Civil Engineers.

Mr. M. Ferguson, Stratford, Ont.

The City Engineer of Stratford, Mr. Mellis Ferguson, is a graduate of Queen's University, Kingston, where he obtained the degree of Bachelor of Science. Before going to Stratford, four years ago, Mr. Ferguson was locating engineer with the Grand Trunk Railway and previously had several years' experience as engineer in charge of location and construction with the Transcontinental and Grand Trunk Pacific Railways.

Mr. Mason H. Baker, St. Thomas, Ont.

The City Engineer of St. Thomas, Ont., Mr. Mason H. Baker, was born at St. Thomas and lived there until he entered the School of Practical Science, from which he graduated in civil engineering in 1906. A year later he completed his post-graduate course and obtained the degree of B.A.Sc. Mr. Baker has seen useful service with the Public Works Department of Saskatchewan, and later with the John S. Metcalf Engineering Company on the construction of the G. T. P. elevator at Midland. For a year Mr. Baker engaged in the survey of Dominion lands in the Peace River district. He is duly qualified as an Ontario and Dominion Land Surveyor. He was appointed Assistant City Engineer (under Mr. Jas. Bell) in the spring of 1910, and within a year, upon the resignation of Mr. Bell, he succeeded to his present office.

Mr. C. H. Rust, Toronto, Ont.

Mr. C. H. Rust, M. Can. Soc. C. E., M. Am. Soc. C. E., City Engineer of Toronto, was born in Essex, England, on December 25th, 1852. He was educated at Brentwood Grammar School and began professional work under the late Mr. Frank Shanly. In 1877 he entered the City of Toronto's service as rodman. In 1881 he was promoted to the position of Assistant Engineer. In 1883 he was appointed by the late Mr. Redmond J. Brough, assistant engineer in charge of sewers, which position he held until 1891. During this period Mr. Rust superintended the construction of one hundred and fifty miles of sewers. From 1887 until 1891 Mr. Rust was principal assistant, and in 1892 was made acting chief engineer. Upon the appointment of Mr. Keating to the position of City Engineer, he was made deputy city engineer. In February, 1898, Mr. Rust was appointed City Engineer. Mr. Rust became a member of the Canadian Society of Civil Engineers in 1887, was elected vice-president in 1901 and president in 1911. In 1899 he was elected a member of the American Society of Civil Engineers, and in 1902 and 1903 was President of the American Society of Municipal Improvements. Mr. Rust is also a member of the American Waterworks Association.

Mr. M. E. Brian, Windsor, Ont.

The present city engineer of Windsor, Ont., was born in that city on October 11th, 1882. He received his early education in his home town and in 1900 was articled to Messrs. Newman Bros., civil engineers. After serving an apprenticeship with this firm for three years, he entered the School of Practical Science, Toronto, from which he graduated in 1906, taking the degree of B.A.Sc. in 1907. His early professional experience was obtained as assistant city engineer of Windsor and also in the office of Mr. J. J. Newman, where he had a good insight into drainage work and general practice. He qualified as an Ontario Land Surveyor in 1906 and became an associate member of the Canadian Society of Civil Engineers in 1909. He was appointed to his present position on January 1st, 1909.

Mr. M. P. Blair, St. Boniface, Man.

The City Engineer of St. Boniface, Man., is a native of Ireland, and was born on February 14, 1882. After spending the first seven years of his life in the Emerald Isle, he left the Old World for the New and went to Detroit, where he remained for one year. Afterwards he was educated at the Chicago public and high schools, the North Western University and the Lewis Institute, Chicago, also the Wesleyan University of Bloomington, Ill.

His first professional experience was obtained with the Chicago, Milwaukee and St. Paul Railway, by whom he was employed for one year as chainman. Afterwards he was employed for two years by the United States War Department on the Topographical Survey for Deep Water Way between Chicago and St. Louis. His next experience was obtained in charge of local improvements at Kennelworth, Ill., where he remained for one year. For two years he was with the Illinois Central Railway on construction and location in Mississippi, Tennessee, Kentucky and Indiana, attaining the position of resident engineer; for a year he was resident engineer for the C. P. R., and for six months assistant city engineer for the city of St. Boniface. He has been city engineer for that municipality for the last four or five years.

City Engineer Blair is an associate member of both the Canadian and American Societies of Civil Engineers. He also holds membership in the American Waterworks Association, the National Geographical Society and the Canadian Cement Association.

Mr. H. N. Ruttan, Winnipeg, Man.

Lieut.-Col. Henry Norlande Ruttan, C.E., has been City Engineer of Winnipeg for more than a quarter of a century. He was born at Cobourg, Ont., on May 21, 1848. Previous to his connection with the city of Winnipeg he had extended experience as engineer and contractor on the construction of the Intercolonial and Canadian Pacific Railways.

City Engineer Ruttan has had a distinguished military career, having served in the Fenian Raids and Northwest Rebellion. He is the possessor of medals for his part in both of these expeditions. The Long Service Decoration has also been conferred upon him.

He was a member of the first Council of the Canadian Society of Civil Engineers in 1887 and was elected Vice-President of that body in 1909 and President in Jan., 1910.

Mr. F. A. Creighton, Prince Albert, Sask.

City Engineer Creighton was born at Dartmouth, N.S., in 1875 and was educated at Halifax Academy. His professional experience was obtained from 1891 to 1893 upon the installation of water and sewerage systems for the town of Dartmouth, N.S. In 1894 and 1895 he served as Assistant Engineer on the Canada Atlantic Railway (Rockland Branch) and the Montreal Park and Island Railway. For three years he was engaged in land surveying and in 1898 became resident engineer for the Midland Railway, after which he was employed for a short time on railway location by the Provincial Government. From 1899 to 1901 he served in the engineering departments of the Dominion Coal Company and the Dominion Iron & Steel Company. Later he entered the service of Messrs. MacKenzie, Mann & Company, with whom he remained until August, 1906, serving as locating engineer and division engineer on var-

TORONTO, ONT.

ST. BONIFACE, MAN.

WINDSOR, ONT.

Mr. C. H. Rust

Mr. M. P. Blair

Mr. M. E. Brian

WINNIPEG, MAN.

PRINCE ALBERT, SASK.

MOOSE JAW, SASK.

Mr. H. N. Ruttan

Mr. F. A. Creighton

Mr. I. Antonisen

[illegible] During [illegible] and [illegible] he was connected with the Quebec and Saguenay Railway, locating their line from [illegible] at St. Joachim to Murray Bay. He was appointed City Engineer of Prince Albert in 1907 and City Commissioner in 1911, holding both these offices at the present date. Mr. Creighton is a member of the Canadian Society of Civil Engineers.

Mr. J. Antonisen, Moose Jaw, Sask.

Mr. Joachim Antonisen, City Engineer of Moose Jaw, was born at Christiana, Norway, on February 24, 1869. For three years he attended school at Christiana and for nine years at Bergen. He graduated from the Latin High School in Bergen in 1887, and matriculated at the University of Christiana. Early in life Mr. Antonisen went to the United States, where he obtained six years' varied and practical experience of engineering. He then returned to Norway and for about six months studied mathematics at Bergen, after which he entered the Polytechnic University at Dresden, Saxony, where he took a four years' engineering course, making a specialty of hydraulics and municipal engineering. Leaving Dresden University in 1898, he entered the service of the government railways as field engineer. After two years' experience in railroad engineering he became associated with the government department of river improvement and road building at Leipzig, Saxony, where he remained for four years. Mr. Antonisen considers that during this period he obtained his most beneficial experience. The city of Leipzig had requested the Saxon Government to have its engineers design a plan for the regulation of the rivers in and around the city to prevent the annual flooding of the lower parts of Leipzig. Mr. Antonisen had the good fortune to be employed on this work, which entailed a thorough study of hydraulic principles in regard to the flow of water in river channels, discharge over weirs and effect of high and low water on the operation of mills, of which there were ten or twelve in and around the city. A most thorough investigation was made and the report prepared subsequently by the engineers called for an expenditure of about $2,000,000. While at Leipzig, Mr. Antonisen was elected an associate member of the Saxon Society of Civil Engineers.

In February, 1905, Mr. Antonisen secured a position with the Canadian Pacific Railway, and left for Winnipeg, Man., where he was appointed resident engineer and was placed in charge of terminals under the late Mr. Schwitzer. In April, 1906, he obtained the post of Town Engineer of Port Arthur. He is in his first year of office in his present capacity at Moose Jaw.

Mr. Antonisen is an associate member of the Canadian Society of Civil Engineers and a charter member of the American Society of Engineering-Contractors.

Mr. L. A. Thornton, Regina, Sask.

City Engineer Thornton was born at Kingston, Ont., in 1880 and was educated at the public and high schools of that city and afterwards at Queen's University and the School of Mining, Kingston, from which in 1906 he received the degrees of Bachelor of Arts and Bachelor of Science (in Civil Engineering). From 1901 to 1905 he was a member of the Trent Canal engineering staff, supervising the construction of the hydraulic lift lock at Peterborough and various other works. From 1906 to 1909 he was employed by the Saskatchewan Public Works Department in bridge construction at Saskatoon and Battleford. He was appointed City Engineer of Regina at the beginning of 1910.

Mr. G. T. Clark, Saskatoon, Sask.

A graduate of the University of Toronto, with honors in mathematics and civil engineering, City Engineer Clark began his professional life on the construction and location of the Temiskaming and Northern Ontario Railway. For a time he was employed in the roadway department at Toronto, following which he was resident engineer for three years with Messrs. Galt & Smith on the construction of water and sewerage works and reinforced concrete structures. During the three years that he has been City Engineer of Saskatoon Mr. Clark has prepared plans and supervised work aggregating in value $2,500,000.

Mr. J. T. Child, Calgary, Alta.

The City Engineer of Calgary hails from England. He served articles with Messrs. Hopkins, Gilkes & Company, general iron manufacturers and constructional engineers, of Middlesborough, and afterwards was for two years with the Ordinance Survey ascertaining parish boundaries in the south of England and Wales. Mr. Child came to Canada in 1883, when he went to Winnipeg and engaged on draining and reclamation work for the government. Two years later there was inaugurated the firm of Child & Timewell, which started in an unostentatious manner by opening a small machine shop in Brandon. The rebellion of 1885, however, had an adverse influence upon trade and Mr. Child severed his connection with Brandon and went to Calgary. There, in 1887, he established the firm of Child & Wilson, architects and engineers, with which he remained for ten years. In 1893 Mr. Child designed and laid the first sewers in Calgary. Later, he superintended the construction of some fifty irrigation ditches throughout Alberta. In 1897 he was appointed Assistant Chief Engineer for the North-West Government, and was stationed at Regina. Mr. Child made connection with the Northwest Irrigation project which had just started at Lethbridge. A year later he received the appointment of Divisional Engineer on the large C. P. R. irrigation works, with which he was associated for four years. In 1907 he was commissioned by the C. P. R. to lay out irrigation works in British Columbia. In the same year he laid out for a private firm the irrigation ditch now carried on by the Southern Alberta Land Company. Mr. Child was consulted during the following year upon the question of bringing water to Calgary by gravitation and relieving the ever-increasing cost of pumping from the Bow River. In that year, 1908, he designed and partly constructed the Calgary gravity water supply system.

Mr. Child was appointed City Engineer of Calgary early in 1909. He is a member of the Canadian Society of Civil Engineers.

Mr. A. J. Latornell, Edmonton, Alta.

The City Engineer of Edmonton is of French Huguenot descent but is a Canadian by birth, having been born at Meaford, Ont. Mr. Latornell began his engineering training in the autumn of 1898 by entering the shops of the W. A. Johnson Electric Company, of Toronto, as special apprentice. After serving in these shops and those of the United Electric Company of Toronto, he entered the School of Practical Science in October, 1900, from which he graduated in May, 1903, with honors in the Department of Civil Engineering. His vacations during this period were spent in survey work in the West.

In May, 1903, he entered the services of the Canadian Pacific Railway as assistant to the resident engineer on maintenance of way at Ottawa, Ont. In June, 1904, he made connections with the Public Works Department of the Northwest Territories, in whose employ he continued until October, 1905, when he returned to the University of Toronto to take the post graduate work in civil engineering. In May, 1906, he graduated from this University with the degree of Bachelor of Applied Science. After graduating, he was employed by the Iroquois Construction Company, of Lockport, N.Y., being engaged on transmission line work for the Ontario Power Company. In July of the same year he resigned to enter the service of the city of Edmonton. There he was employed first as instrument man on construc-

REGINA, SASK.

Mr. L. A. Thornton

SASKATOON, SASK.

Mr. G. T. Clark

CALGARY, ALTA.

Mr. J. T. Child

EDMONTON, ALTA.

Mr. J. Latornell

MEDICINE HAT, ALTA.

Mr. A. K. Grimmer

LETHBRIDGE, ALTA.

Mr. A. C. D. Blanchard

[illegible] and later as assistant city engineer. In May, [illegible] Mr. Latornell was appointed acting city engineer of Edmonton. He succeeded to his present position in February, 1910.

Mr. A. C. D. Blanchard, Lethbridge, Alta.

City Engineer Blanchard is a native of Windsor, N.S. He was educated at the County Academy and afterwards at King's College and McGill University, obtaining from the last named seminary the degree of Bachelor of Science, with honors. Upon leaving McGill, in 1901, Mr. Blanchard accepted a post with the American Bridge Company at Trenton, N. J., and in the same year went to Niagara Falls as assistant engineer on the construction of the 100,000 h.p. hydro-electric works of the Canadian Niagara Power Company. In 1906 he was resident engineer on the construction of the 30,000 h.p. hydro-electric plant of the West Kootenay Power & Light Company at Bonnington Falls, B.C., and in the following year was appointed assistant engineer on the staff of the City Engineer of Toronto, in charge of various works, particularly the design and construction of the main drainage system. He was appointed City Engineer of Lethbridge last year.

Mr. A. K. Grimmer, Medicine Hat, Alta.

The City Engineer of Medicine Hat, Alta, Mr. A. K. Grimmer, is a native of New Brunswick, having been born in St. Andrew's in 1882. At the termination of his high school course he entered the University of New Brunswick, where, in 1904, he graduated in civil engineering. His early experience was obtained in various capacities on the C. P. R. surveys. For a time he was employed as draughtsman on the Transcontinental Railway. After graduating he was appointed chief engineer on the Glenn extension of the York and Carleton Railway, which position he resigned in 1905 to become assistant engineer on the installation of sewers and filtration plant at Fredericton. In May, 1906, he was appointed City Engineer of Fredericton, and continued to fulfil the duties of that office until 1909, when he accepted a position on the staff of the University of Manitoba.

Mr. Grimmer has had considerable experience in consulting work on water power development. His investigations in this connection include a report for the J. Gibson & Sons Lumber Company, Limited, on the development of the Nashwash River, N.B., and a similar proposition in Nova Scotia. The town of St. Mary's, N.B., engaged Mr. Grimmer to design their water supply fire protection system.

During the time that Mr. Grimmer was City Engineer of Fredericton he specialized in water purification and devoted some months to studying the design and operation of filtration plants in the eastern States. For a thesis on original research work in this connection he received the degree of M. Sc. in May, 1909.

Mr. Grimmer was appointed City Engineer of Medicine Hat in April, 1910

Mr. Robert Potter, Fernie, B.C.

The City Engineer of Fernie is a Nova Scotian by birth, having been born in Halifax, N.S., thirty-two years ago. He received his early education at Halifax and in 1899 entered Queen's University, Kingston, on a combined Arts and Science course, at the termination of which he graduated as Bachelor of Science in Civil Engineering.

From 1901 to 1904 Mr. Potter was associated with his brother Mr. Alexander Potter, C.E., of New York City, on the construction of a joint trunk sewer for the city of Newark, N.J., and six adjacent municipalities. During the summer of 1905, Mr. Potter had charge of the extension of the sewerage system of New Rochelle, N.J. In the following year he was engaged on the Grand Trunk Pacific Railway construction in Saskatchewan. Mr. Potter has occupied his present office since 1907. During the period of his incumbency he has designed and constructed a complete system of sewerage and a new water supply system for Fernie. In private practice Mr. Potter has designed several systems of water supply for municipalities in British Columbia and Alberta.

Mr. Allan Waters, Nanaimo, B.C.

The City Engineer of Nanaimo was born in the county of Sussex, England, in 1868, and was educated at the Collegiate School, Tunbridge Wells, Kent. On leaving school he was articled to Mr. S. W. Haughton, M.S.A., architect and surveyor, and upon the completion of his articles entered the office of a London architect and district surveyor. Later, in architectural offices in Derby and Manchester, he obtained extended experience on the erection of large business blocks and ecclesiastical buildings. Mr. Waters left the Midlands for South Wales upon his appointment as assistant surveyor to the Barry and Codoxton local boards, afterwards entering the offices of the Metropolitan Board of Works of London (now defunct) where he was engaged chiefly on main sewer extensions.

In 1893 Mr. Waters received an appointment on the staff of the Director of Works of the Admiralty, being appointed to the Devonport Naval Yard under Mr. E. Colson, C.B., an eminent dock and harbor engineer who designed the large Alexandra dock at Malta and the Dover harbor, among a number of other noteworthy works. During this period Mr. Waters was engaged on plans for new shipbuilding slips, machinery shops, extensive additions to the Naval Engineering College and dock construction work. In 1896 he received from the Admiralty the appointment of Officer-in-Charge-of-Works at the Halifax, N.S., Naval Yard, where his work consisted chiefly in the extension of wharves and miscellaneous construction and maintenance.

Mr. Waters returned to England in 1899. After a short period at the Admiralty head office in London he was sent out to the Island of Ascension on the west coast of Africa, immediately before the outbreak of the Boer war, as engineer-in-charge of various works of fortification, water supply and new buildings. Upon the completion of this construction he returned to England and received a gratuity as a recognition of his services.

Upon the termination of the Boer war, Mr. Waters left the Admiralty and went to the northern Transvaal to join three brothers who had served through the campaign. Among his various commissions were the preparation of reports on irrigation schemes promoted by the mining companies of the Rand and several important works of building construction. Later, he accepted an engagement with Mr. D. Leitch, engineer of the Johannesburg municipality and formerly an Assistant Director of Works at the Admiralty. In 1906 Mr. Waters left the Transvaal for Australia. Obtaining an appointment with the Ferro-Concrete Company, of Australia, he went to Auckland, N. Z., where the company had extensive contracts from the Harbor Board for the reconstruction of large reinforced concrete wharves and docks.

Upon the completion of the above work Mr. Waters accepted a position with the City Engineer of Auckland. In 1909 he left New Zealand for British Columbia and was appointed City Engineer of Nanaimo after a short term with the Provincial Lands Department.

Mr. J. W. B. Blackman, New Westminster, B.C.

City Engineer Blackman was born in Kent, England, in 1878, and was educated at Highbury House College, St. Leonards-on-Sea. His early professional training was received at the hands of Mr. G. F. Miller, M.I.M.E. Later, he took a course at the Brighton College of Engineering and Science, where subsequently he held a mastership. For six years he practised his profession in the city of Brighton,

FERNIE, B. C.

NANAIMO, B. C.

NEW WESTMINSTER, B. C.

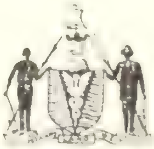
Mr. R. Potter

Mr. Allan Waters

Mr. J. W. B. Blackman

NORTH VANCOUVER, B. C.

PRINCE RUPERT, B. C.



VANCOUVER, B. C.

Mr. G. S. Hanes

Mr. W. M. Davis

Mr. F. L. Fellowes

[illegible] During this period he was a frequent contributor [illegible] "The "Builder" Journal," one of the best known periodicals of the kind in London; [illegible] plans, and "Modern Buildings," amongst other standard books, gave [illegible] specimens of his handiwork. After the early stages, however, Mr Blackman devoted the greater part of his attention to the various phases of municipal engineering. Mr. Blackman has had valuable experience in the construction of sewage disposal works, modern systems of drain sewers and special adaptations of mechanical and scientific sanita- [illegible] He is an Associate Member of the Canadian Society [illegible] Civil Engineers, a Professional Associate of the Surveyors' Institute (Eng.), and a Member of the Society of Architects of England. In 1907 he accepted an appointment as manager for Mr. J. H. Brownlee, C.E., of Vancouver, with whom he remained until March, 1909, when he went to New [illegible]

Mr. G. S. Hanes, North Vancouver, B.C.

Mr. Geo. S. Hanes, City Engineer of North Vancouver, graduated from the School of Practical Science, Toronto, in 1903, and obtained the degree of B.A.Sc. from the University of Toronto in 1905. He is thirty years of age.

Mr. Hanes served one year as apprentice to Mr. J. J. Newman, O.L.S., and in May, 1905, obtained his certificate as an Ontario Land Surveyor. From March, 1906, until December 31, 1908, he occupied the office of city engineer of Windsor. One of the features of Mr. Hanes' work at Windsor was the construction of some 32,000 square yards of concrete paving which was laid during 1907 at a cost of about one dollar per square yard. The work was new at the time and was carried out solely upon the recommendation of Mr. Hanes, who prepared a number of valuable specifications. This first concrete paving was so satisfactory that ultimately it entirely displaced the macadam pavements which had been laid previously. The city of Windsor continued to construct this class of pavement during 1909, 1910 and 1911, until nine miles had been put down. Mr. Hanes' introduction of concrete pavements in Windsor resulted in his obtaining substantial recognition from the city council.

In December, 1908, Mr. Hanes was selected out of 108 applicants for the post of City Engineer of North Vancouver and has continued in that office until the present time.

Lt.-Col. W. M. Davis, Prince Rupert, B.C.

Lieutenant-Colonel William Mahlon Davis, City Engineer of Prince Rupert, B.C., graduated from the Royal Military College in 1880. After engaging for three years in railway engineering work in Iowa and Missouri he obtained the appointment of engineer for the town of Woodstock and County of Oxford, remaining there for thirteen years. Subsequently he was town engineer of Berlin, Ont., for twelve years, during which period he practised as a consulting engineer on municipal work, making a specialty of waterworks and sewerage. He was appointed City Engineer of Prince Rupert in June, 1910. City Engineer Davis has always taken an active interest in military matters. For twelve years he held a commission in the Oxford Rifles, from which regiment he retired with the rank of major. He served on the staff of the West Ontario Command as Brigade Major and later organized the 24th regiment of Grey's Horse, which he commanded for two years, retiring with the rank of Lieutenant-Colonel. He assisted in the organization of the Berlin Canadian Club, of which he was president in 1910.

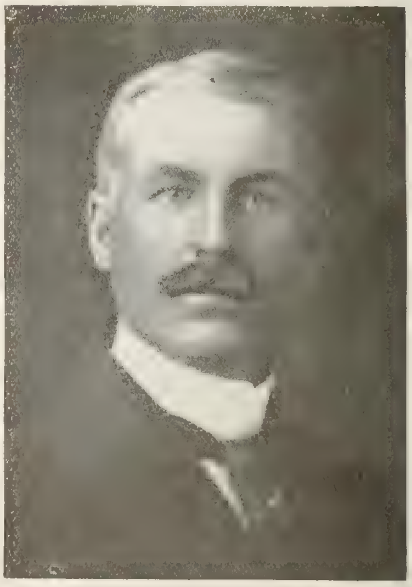
Mr. Angus Smith, Victoria, B.C.

Mr. Angus Smith, city engineer of Victoria, B.C., was born in Kent County, Ont., on August 31st, 1868. After graduating from the Collegiate Institute at Ridgetown, Ont., he entered the School of Practical Science, now the Department of Applied Science, University of Toronto, taking the full course in civil engineering, and graduated in May, 1894. Mr. Smith was commissioned a provincial land surveyor for Ontario in 1896, and is a member of the Canadian Society of Civil Engineers.

During the vacation of 1893 he was engaged as assistant engineer on the construction of a waterworks system for Dolgeville, N.Y., and after graduating in 1894 was assistant on the Penn Yan, N.Y., waterworks system, upon which he prepared an interesting paper for the Canadian Society of Civil Engineers. During the next five years, until 1900, he engaged in private practice as a civil engineer and surveyor at his home town, Ridgetown, Ont., where he soon made a reputation as a drainage engineer throughout Western Ontario.

From 1900 to 1906 he was engaged as city engineer of Stratford, Ont., during which time the city began and carried out its extensive paving programme, sewage disposal plant, trunk sewer, development of its water supply and many other important works.

VICTORIA, B. C.


Mr. Angus Smith

In 1906 he went west to Regina, Sask. The works carried out there under his supervision amounted to over $1,000,000. While in the prairie country, Mr. Smith superintended the installation of a complete waterworks system for Francis, Sask., and advised the city of Moose Jaw, Sask., in connection with its proposed paving plans, street railway undertaking, and the development of its water supply.

In March, 1910, Mr. Smith went farther west to Victoria, where as City Engineer he has had the supervision of many important public works.

Mr. F. L. Fellowes, Vancouver

The present City Engineer of Vancouver was born in Ottawa, Ont., about forty-nine years ago. He was articled to a firm of civil engineers and land surveyors and among the first important works of which he was given charge was bridge foundation work under Mr. C. H. Keefer, of Ottawa. Next he was assistant engineer at West Toronto Junction, where he had charge of sewer and subway construction, macadam road building and over-head bridge work. Later he was employed on the short line (now C. P. R.) railway connecting New Brunswick and Quebec. For some time he was assistant engineer of the Central Ontario Railway and was employed on hydraulic power construction work on the Trent Canal, near Trenton. He went to the Northwest on land surveying work before the Riel rebellion. Returning he took up the practice of his profession at Toronto and supervised the construction of the Keele street subway, which involved an outlay of some $200,000.

Some fourteen years ago Mr. Fellowes went to Montreal, and after three years' private practice was appointed engineer for the (then) town of Westmount. During this period he was connected with many important local projects. He worked for a year in conjunction with Mr. F. H. Pitcher, engineer of the Montreal Water & Power Company, and Mr. J. C. Macklin, hydraulic engineer, securing data and preparing a report on the best location for the intake of the M. W. & P. Company. Also, he conducted surveys on the River St. Lawrence to determine the velocity and direction of currents and points of shore sewage contamination, with a view to the establishment of a waterworks system for the city of Westmount. Later, he was associated with Mr. Geo. Janin, chief engineer of Montreal, and Mr. Willis Chipman, of Toronto, representing the Federal Government, as a commission to report on the best system of drainage for the west end of the city of Montreal and adjoining municipalities, including the question of the relation of the Little River St. Pierre to the entire new drainage system. He investigated the various systems of lighting, filtration and incineration in vogue in leading cities in Canada and the United States, and on his report the plants now in operation in Westmount were established.

Mr. Fellowes was appointed Chief or Supervising Engineer at Vancouver at the beginning of 1911.

Municipal Engineering Notes

Mr. W. M. Davis, City Engineer of Prince Albert, is at present engaged in the design and construction of works involving an expenditure of $1,500,000.

City Engineer Edington, of Moncton, N.B., has designed and is now constructing a new dam for impounding reservoir, leading and distributing mains and pumping plant.

During the year 1911 about three miles of concrete sidewalks, six sanitary sewers, one mile of macadam road (21,550 sq. yds.) and 6,150 square yards of asphalt block pavement on concrete base were constructed as local improvements at Kingston, Ont., under the direction of the City Engineer, Mr. R. J. McClelland.

Among the extensions which are being made this season at Hull under the supervision of City Engineer Laforest may be mentioned 29,000 feet of water main from 6 to 20 inches in diameter; the laying of 10,000 feet of sewer pipe; [illegible] and the erection of two fire stations. The asphalting of a number of city streets is under consideration.

The [illegible] of Mr. [illegible], City Engineer of Fernie, which is published in another column, [illegible] seeing a thriving city changed in a few hours to a desolate [illegible] to-day is a more modern and a more sanitary Fernie than the one which was destroyed in the fire of August, 1, 1908.

Among the more important works that are being carried out at Regina under the supervision of City Engineer Thornton is a subway under nineteen tracks of the Canadian Pacific Railway. During the two years that Mr. Thornton has held office at Regina there have been undertaken several miles of pavements and concrete sidewalks, extensive additions to the waterworks and sewerage systems, and the design and construction of a municipal street railway.

City Engineer Ferguson of Stratford, Ont., is now completing from his plans a sewage disposal plant, consisting of septic tanks and sprinkling filter. He has prepared plans and specifications and made assessments under the Municipal Drainage Act for a storm sewer and covering for Romeo Creek. The plans call for a 6-foot egg-shaped concrete main with branch drain of the same size. The main culvert, which will be a mile and a quarter in length, involved the measuring and assessing of over a thousand properties.

The head of the moose, which represents the coat-of-arms of the city of Moose Jaw and which is reproduced elsewhere in this issue, above the photograph of City Engineer Antonisen, has an interesting connection. The Indian name for Moose Jaw means "the place where the white man mended the broken wagon with the jaw bone of a moose." The name of the city is not altogether euphonious, but it has proved to possess sufficient individuality to withstand a number of attempted substitutions.

During the last two years about twelve miles of macadam pavements and permanent sidewalks have been built at Prince Albert, Sask. City Engineer Creighton is now designing an intercepting sewerage system, including collecting stations, sewage pumping plants and disposal works. Another work which will come up this year at Prince Albert is the re-designing of the pumping plant and the installation of several more units to meet the growing needs of the city. The filtration plant which was installed last year has been giving excellent satisfaction.

An extended programme of municipal work is under consideration at London, Ont. Among the more important items are a topographical map of the city; the preparation of plans and specifications for a complete storm water system; the extension of sewage disposal works; several miles of cement walks, sewers, curbs and gutters, and about 40,000 square yards of permanent pavements, for which bylaws have been passed; the erection of a new City Hall; hydro-electric lighting extensions; construction of a $50,000 incinerator plant and the installation of a garbage collecting system; street railway extension, including the construction of a 600-foot subway under the C.P.R. tracks; the erection of a 270-foot span highway bridge, and a two mile extension of the ornamental lighting system. Two new schools are to be erected and new wings added to the Victoria Hospital. About twenty miles of street oiling will be done this season. Another undertaking is the systematic layout of pavements and roads throughout the city by defining certain areas for certain classes of pavements. This is arrived at by taking into consideration the amount of traffic tonnage using the streets, the location to the centre of the city, the class of buildings, and the value of the real estate. This works out so that the central portions are composed of permanent pavements and the outskirts consist of gravel roads. All this work will come under the supervision of the City Engineer, Mr. Geo. W. Wright.

The [illegible] Company, Limited, Truro, N.S., engineers, boiler makers and founders, have recently constructed new buildings and installed new machinery. They now have [illegible] efficient management and they will cheerfully furnish drawings and estimates for anything in their line.

Engineering Work at Moncton, N. B.

The City of Moncton has now a population of about [illegible] and has an area within its limits of 2.16 square miles. Its public utilities consist of waterworks, sewerage system, electric light and power plant, gas works and street railway. At present natural gas is being introduced from wells [illegible] eleven miles. The waterworks, electricity and gas plants were installed by a company and operated by them for a number of years, and in 1896 were expropriated by the city. Last year, however, the electricity and gas plants were leased to a company which is introducing natural gas and street railway. About fifteen miles of natural gas pipes are laid and the gas is already in the city. Two miles of railway are also constructed and in operation.

Sewerage System.—The sewerage system is of the combined principle, the city being divided into eight blocks, or drainage areas—each block having a separate trunk sewer into which the laterals discharge—and consists of tile pipes ranging from nine to twenty inches in diameter, the larger sizes being constructed of brickwork, egg-shaped in sectional area; also a few outlets of timber, all the sewers comprising a total length of 16.64 miles. During the past few years about ten miles have been constructed of all sizes. The sewage is discharged into the Petitcodiac River, which is a tidal river and forms an easy and effective means of its disposal.

Water Works.—The waterworks system was first inaugurated in 1879 with a storage reservoir capacity of 32,000,000 gallons and about six miles of mains. Extensions were made as the requirements of the city demanded, and since the present Engineer's connection with the system the reservoir has been increased to 200,000,000 and the mains to twenty-five miles, while a pumping station has been constructed, in which, in addition to a steam reciprocating pump, there are two turbo-electric pumps in operation, one for domestic use and the other for fire. At the present time a new supply is under construction, consisting of storage reservoir, pumping station and leading mains.

Electricity and Gas Works.—These works, like the water system, were expropriated by the city in 1896, but last year were leased to a company who are introducing the natural gas. It was the duty of the present City Engineer, Mr. J. Edington, to superintend these works, and besides constructing gasometer, retort benches and purifiers, in connection with the gas works, he designed and superintended the construction of the power plant, which now has a capacity of 750 kilowatts.

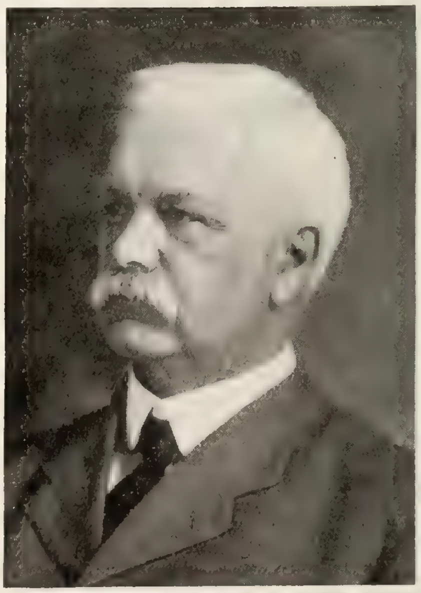
Streets.—The total mileage of streets, roads and lanes within the city limits is 27½ miles. Wood paving is laid on the business streets and macadam on the residential streets. The practice is to do so much permanent work each year, but owing to the introduction of natural gas, permanent street work will be somewhat curtailed this year as the trenching for pipes will cut up the streets too much for this work to be done properly.

Sidewalks.—Asphalt was formerly the standard in Moncton, but two years ago concrete was adopted and there are now 5.63 miles of this class of sidewalk laid. With careful construction, this material makes a first-class walk and so far no trouble has been experienced with cracks or other defects. This year will probably see the mileage greatly increased.

North Vancouver has a population of about 6,000. The building permits for 1911 amounted to nearly $800,000 and the municipal work carried out last year under City Engineer Hanes' supervision represented a value of $866,000. During the active season about 1,400 men were employed on the various work. The city's programme for the present season involves an expenditure of about $575,000. An interesting project that is now in hand is the converting of Rice Lake into a storage reservoir for the city. This lake has an elevation of 660 feet above sea level and holds 80,000,000 gallons of water. It covers sixteen acres and is from 20 to 30 feet deep. A tunnel about 1,000 feet in length is now being driven to drain the lake, after which the sides will be sluiced by hydraulic methods and the basin made absolutely clean and free from vegetable matter. A pipe line will be laid from Lynn Creek for the purpose of filling the reservoir. The cost of this work will be about $100,000. A few months ago, the new concrete ferry wharf was completed at a cost of about $40,000. It consists of concrete footings, piers, beams, and floor slabs, of reinforced concrete, so built as to form a continuation of the main street end, the centre portion being paved with wood blocks, and both sides finished in the form of concrete sidewalks. The dock is illuminated with cluster lights of five globes each, on the top of reinforced concrete lamp-posts. This dock was designed by the City Engineer, Mr. Hanes, and is perhaps the only one of its kind in America.

The Chief Engineer of the Department of Marine and Fisheries

Lieut.-Col. William Patrick Anderson, M. Inst. C. E., Past-President Can. Soc. C.E., F.R.G.S., Chief Engineer of the Department of Marine and Fisheries of the Dominion Government, was born at Levis, Que., Sept. 4, 1851, and was educated at Bishop's College, Lennoxville and Manitoba College. He married Dorothea S. Small, the eldest daughter of H. B. Small, on Oct. 18, 1876. He entered the civil service as assistant engineer of the Marine Department in October, 1874, and was promoted to his present position in February, 1880. His duties are defined as embracing most of the technical work in his department, including the construction of lighthouses, lightships, fog alarms, buoys and beacons; supervision of construction and repairs to lifeboats; the administration of the vote for the removal of wrecks and obstructions in navigable waters; engineering points in connection with the construction and maintenance of fish passes; supervision of surveys for oyster beds; examination of applications for foreshore, wharf and water lots as they affect the interests of navigation; preparation and publication of notices to mariners and hydrographic notes.



Lt.-Col. Anderson, Ottawa, Chief Engineer Department of Marine and Fisheries

During the thirty-two years that Col. Anderson has occupied his present position he has designed and erected over

600 lighthouses and 100 fog alarm installations. The following are among his best engineering works: a complete hydrographic survey of the Bay of Quinte; construction of a lighthouse on a caisson foundation in 13 ft. of water on Colchester Reef and another in 14 ft. of water in Pelee Passage, Lake Erie, fireproof throughout; the building of a permanent lighthouse in the traverse of St. Roch in 42 ft. of water and a tideway of over 7 knots; the installation of a first-order siren, worked by compressed air, on Belle Isle, with power obtained from the lakes on the hills; and the building of a large number of reinforced concrete cast iron, and steel lighthouse towers.

Col. Anderson is a member of council and executive committee of the Dominion Rifle Association and is a well known rifle shot, having represented Canada at Bisley and having later commanded the Bisley team. In 1900 he won the Governor-General's match, the big prize of the Dominion meeting. In 1885 he established the Canadian Militia Gazette and edited it for two years. He is a charter member of the Canadian Society of Civil Engineers, having been one of the committee to draft its constitution, and has been its president. He commanded the Forty-Third Battalion, Ottawa and Carleton Rifles up to January, 1892, when he was placed on the retired list. He has been Chairman of the Public School Board of Ottawa and is now Chairman of the Geographic Board of Canada.

The Chief Engineer's branch of the Department of Marine and Fisheries is entrusted with the construction of all aids to navigation and, in consequence of the rapid development of Canadian shipping, an immense amount of work is now undertaken annually. At present the yearly expenditure is $1,000,000, but as this is distributed in comparatively small amounts all over the Dominion the detail of designing required is very great. During the past season the principal construction work undertaken by the Department of Marine and Fisheries included the erection of range lights on Badgeley Island, Lake Huron; the construction of reinforced concrete lighthouses with accessory buildings on Michipicoten Island and Parisienne Island in Lake Superior; the construction of range lights to lead into Kingston Harbor; the rebuilding in reinforced concrete of the rock lighthouse at the entrance to Parry Sound, and the installation in the new building of a diaphone fog alarm; the complete remodelling of the light station on the south point of the Island of Anticosti, with the installation of a modern fog alarm; the building of a first order lightstation at Point Ferolle in Newfoundland; the construction of two lighthouses on piers in Gaspe Harbor; and the preliminary work of construction of a lighthouse on Flat Island, and another on St. Mary's Island, on the Labrador coast; the lighting and buoying of a new channel below St. Anne, at the mouth of the Ottawa River; the building of a lighthouse on a concrete pier designed to resist ice shoves near St. Helen's Island, Montreal; the establishment of a fog alarm at the entrance to Prim Point, N.S.; and the building of a lighthouse on a composite pier in Sydney Harbor, N.S.

The city of Fort William has made rapid strides during the last few years. The population has increased from slightly under 7,000 in 1906 to 22,000 at the present time, during which period the following work has been carried out: gravitation water supply and distribution, $896,000; sewers 27.2 miles, $803,000; paving 71,000 square yards, $248,000; concrete sidewalks, 55,600 lineal feet, $150,000; reconstruction and double [illegible] of street railway, [illegible]. In all of this work the present City Engineer, Mr. Jno. Wilson, has had an active part, either in his present capacity or as assistant city engineer.

The Engineer-in-Charge of the Lachine Canal

Lieutenant-Colonel Henry Robertson Lordly, C.E., Montreal, Engineer-in-Charge of the Lachine Canal, was born at Rothesay, N.B., on December 12, 1868. He received his early education at the St. John Grammar School and at the age of twenty was Instructor in Drawing at the night classes of the Mechanics' Institute at St. John. In September, 1889, he entered the College of Civil Engineering at Cornell University, Ithica, N.Y. At the Dominion Exhibition at Toronto he was awarded first prize for Studies in Perspective. He remained at Cornell University for four years, but in the summer of 1890 he was employed on the surveys of South Dakota, and in the vacation of 1892 on the construction of a hydraulic power plant near Ithica. In 1893 he graduated with the degree of Civil Engineer and was elected president of the Cornell Association of Civil Engineers. In the early part of 1894 he was employed in the C.P.R. bridge department at Montreal. Later he returned to the Maritime Provinces to undertake special work for a lighting syndicate. Returning to Montreal in 1900 he was appointed in the following year Engineer-in-Charge of the Lachine Canal, a position which he has held since that date. An article descriptive of some of the work carried out under his supervision will be found in another column. Col. Lordly has made a specialty of concrete work and holds a patent for a system of construction of concrete building members. He is a member of the Canadian Society of Civil Engineers, of which for one year he was Honorary Librarian.

Lt.-Col. Lordly, Montreal,
Engineer-in-Charge of the Lachine Canal

A number of valuable technical papers have been written by Col. Lordly. Among these may be mentioned: "The Railway Transition Curve and Subaqueous Concrete Work," published in the Transactions of the Canadian Society of Civil Engineers; "Gas for Light and Power Purposes;" "Electrically Operated Lock Gates," and "Anti-friction Bearings," published in the Transactions of the Cornell Association of Civil Engineers. The latter paper was awarded the Fuertes Gold Medal, which is presented yearly by Cornell University for the best contribution to engineering knowledge, and which has been won to date by only two Canadians, the other being Professor [illegible], formerly of Fredericton.

Col. Lordly has served in three branches of the Canadian Militia, namely, the Infantry, Engineers and Corps of Guides. In [illegible] he joined the [illegible] Fusiliers [illegible] and [illegible] He became a [illegible] and a [illegible] of Guides, at Montreal, in 1904. [illegible] rank of Major and in 1907 success- [illegible] pro- moted Lieutenant-Colonel in April, 1911, and was granted the Long Service Medal for the Auxiliary Forces in May, 1911. At present he is Commanding Officer of the Corps [illegible] the 4th division, Montreal. Col. Lordly is a [illegible]. He is the holder of the Governor-General's [illegible] the Lieutenant-Governor of Quebec.

Mr. W. Chase Thomson, M. Can. Soc. C. E.

Mr. William Chase Thomson, M.Can.Soc.C.E., Manager for Canada for the Cleveland Bridge & Engineering Company, Limited, of Darlington, England, was born at St. John, N.B., Jan. 5, 1866. He is a son of the late Charles Daniel Thomson and is of United Empire Loyalist descent.

Mr Thomson's earliest experience in engineering was in connection with the location and construction of a short line of railway in Nova Scotia, between Oxford and New Glasgow (now a branch of the Intercolonial Railway), where he was employed as rodman from the spring of 1882 till the autumn of 1883, when operations were suspended. He then took up the subject of telegraphy at Hampton Station, on the I.C.R., and after six months' study was appointed Assistant Station Agent and Telegrapher at Houlton, Me., on the New Brunswick Railway (now belonging to the C.P.R.), where he remained three years. In June, 1887, he obtained a position on the engineering staff of the I. C. Railway at Moncton, N.B., under Mr. P. S. Archibald, who was then Chief Engineer, and Mr. W. B. MacKenzie, Assistant Engineer. In this position, which he held four years, he obtained much valuable experience in making [illegible] lines, designing and laying out buildings, wharves, etc., also in computing stresses in and designing steel bridges and roof trusses.

Mr. W. Chase Thomson, Montreal

Having become particularly interested in the design and construction of bridges, Mr. Thomson decided to make a specialty of this branch of engineering. Accordingly, in April, 1891, he obtained a position with the King Bridge Company, of Cleveland, Ohio, with whom he remained three years.

Not wishing to settle permanently in the States, he applied for and obtained a position with the Dominion Bridge Company, of Montreal. This engagement began in June, 1894, and only ended after sixteen years. On July, 1, 1910, Mr. Thomson was appointed to his present position. He has been connected with the Canadian Society of Civil Engineers from its beginning in 1887, entering as Student. In 1894 he was elected an Associate Member and became a Member in 1900. He has written for the technical journals and is the author of two books, viz.: "Bridge and Structural Design" and "The Design of Typical Steel Railway Bridges," which are published by the Engineering News of New York. The first edition of the former was issued in 1905, but it was entirely re-written and appeared again in 1910. The latter book was published in 1908.

A Quebec Man with Big Interests

Mr. L. H. Gaudry, president of the firm of Messrs. L. H. Gaudry & Company, Limited, Quebec, one of the best known firms in the municipal and contracting field of Eastern Canada, is a native of Quebec, having been born there in 1873. Mr. Gaudry has been in business in the ancient capital for some fifteen years. From 1898 to 1903 he dealt extensively in contractors' supplies, while from the latter date until 1909 he imported cast iron pipes extensively from Great Britain, acting as representative for the celebrated firm of Robert MacLaren Company, Limited, of Glasgow, Scotland. During the same period Mr. Gaudry engaged extensively in the importation of plain and fabricated steel for buildings, builders' castings, steel windows, etc. Mr. Gaudry had his head office in Quebec, with a branch office in Montreal, until April, 1909, when the increasing scope of his operations made it desirable to organize a limited stock company, the concern bearing his name, of which Mr. Gaudry is the president. In 1910 Mr. Gaudry organized the Eastern Canada Steel & Iron Works, Limited. This company, of which Mr. Gaudry is managing-director, manufactures all kinds of structural steel work. The head office of the concern is in Quebec, with a branch office in Montreal and works at St. Malo, near Quebec. In May, 1911, Mr. Gaudry also organized the Dominion Architectural Iron Works, Limited, of which he is president.

Mr. L. H. Gaudry, Quebec

An extensive business is carried on by each of the three concerns which come under the management of Mr. Gaudry. As importers of cast iron pipes L. H. Gaudry & Company, Limited, have supplied the cities of Winnipeg, Toronto, Ottawa, Montreal, Quebec, and others too numerous to mention, while they have furnished the iron work and steel construction for the Quebec Technical School, the new Montreal Jail, and other noteworthy buildings in that section of the country.

The Eastern Canada Steel & Iron Works, Limited, have supplied and erected the structural steel work for numerous important buildings in the province of Quebec, many of which have been described from time to time in these columns, and of which the Art Museum Building at Montreal is one of the most recent. Their contracts also include a number of highway bridges, varying from 50 to 600 feet long.

The Dominion Architectural Iron Works, Limited, have completed contracts for the ornamental iron work upon the Gillette Building, Herald Building, Art Association Building, Coronation Building, and a number of apartment houses at Montreal, as well as for the C.P.R. round houses and for the Harbor Commissioners' work.

Mr. Gaudry's interests have thus identified him with some of the most important construction in this section of the country and it is fair to assume that he will continue to play a part of growing importance in the development of Eastern Canada.

The Manitoba Bridge and Iron Works Limited

Probably the most notable industry west of the Great Lakes is the bridge and structural plant erected and equipped during the year 1910 by The Manitoba Bridge and Iron Works, Limited, at Winnipeg. This was the first plant of its kind west of Toronto, and is unexcelled in point of equipment and facilities for handling the class of work for which it is designed.

The principal shop is 450 ft. in length by 140 ft. in width, and is equipped with two 15-ton electric travelling cranes, one 60-in. rotary planer, one 36-in. rotary planer, gate shears, friction saws, straightening rolls, spacing tables, [illegible] [illegible] rication of intricate structural work.

Mr. T. R. Deacon, C.E., M.E.
President and General Manager Manitoba Bridge & Iron Works, Ltd., Winnipeg

The bridge and structural steel branch of the business of the company, while probably the greatest in volume, is a comparatively recent venture. For some time the company have had in operation a fully equipped foundry with a capacity of twenty tons a day; a large machine shop; forge and pattern making shops, and a plate and sheet iron working shop. The principal lines in which these departments are engaged are transmission machinery, contractors' equipment, and steel tanks, although a large jobbing business is done in rough castings as well. The total capacity of all branches of the works will approximate 20,000 tons a year.

This company commenced operations in 1903, acquiring at that time the business of the Standard Iron Works, of Winnipeg, this being operated by Messrs. Coulter & Lyall. When this business was taken over, a block of land comprising about two acres was purchased, a foundry, machine and forge shops being erected thereon, and employment given to thirty men during the first year. Since then, both land and equipment have been largely increased. The business has advanced yearly and it can now be claimed to be one of the large iron working establishments of the country, having a monthly pay roll of over $20,000, and employing about 350 men.

The company contemplate the erection of a shop, having a capacity of 3,000 tons a month, for the construction of bridges and heavy structures. This they hope to have in [illegible]

Mr. H. B. Lyall, Winnipeg.
Secretary Manitoba Bridge & Iron Works

[illegible]

Mr. Charles Beresford Fox, consulting engineer, Toronto, whose death occurred recently in that city, was the [illegible] Partners, civil engineers, London, Eng. The late Mr. Fox [illegible] was in partnership with Mr. Edmund Wragge. Prior to [illegible]

Canadian Marble from South Stukely, Que.

Exquisite Decorative Varieties from the Quarries of the Dominion Marble Company—Facilities and Equipment of the Plant

WITH the remarkable growth of Canada in wealth and population, there is a commensurate development of the natural resources of the Dominion. The increase in building operations daily calls for more structural and decorative materials. Patriotic feeling naturally demands that they shall be, as far as possible, of native production. This is giving a decided stimulus to quarrying operations throughout Canada and while many of the quarries are of comparatively recent development some of them are already prominent factors in the building trade of the country.

An enterprise that bids fair to become no inconsiderable factor in the marble situation of Canada, as well as of the United States, is the Dominion Marble Company, Limited, of Montreal. The quarries of this company are located at South Stukely, in the township of Bedford in the Province of Quebec. The marble produced at these quarries has some unique features, not only as compared with American stones, but also when brought into comparison with any of the European marbles. A verbal description of material in which color and marking play the most important part must be inadequate, but some help can be had by comparison with other marbles that are already widely known in the architectural world.

Dominion Marble Company's Plant

The South Stukely marbles are wholly decorative, being marked by brilliant colorings and bold patterns. The stone is dense and fine-grained, having a very low ratio of absorption and taking a high, durable polish. The groundmass is of a creamy white, and this is mottled and veined with a variety of tints, the prevailing colors being rose, green, blue and violet. The rose and blue shades are distinctive colors. The violet shades off into mauve and purple, with the rich tints of the grape and the plum. The greens range through sap green to oxide of chromium and terre verte. It must not be thought that the color is evenly distributed through the marble. It is limited to bold veinings and cloudings, the cream-white largely prevailing, so that it is distinctly a light marble with pronounced decorative effect. The foreign marbles that naturally suggest themselves for comparison are Fleur de Pecher, Breche, Violette, Breche Stazzema and Pavonazzo. All of these, however, are brecciated marbles. They are found in the Carrara region and were originally white marbles, like those that gave the district its great fame. Some terrible convulsion of nature broke the Carrara marbles into angular fragments, ranging in size from less than an inch to more than a foot in diameter. During the course of the ages, percolating water, holding various minerals in solution, cemented these fragments together. The colors which make these marbles desirable are found almost wholly in the cementing material, the ground-mass being the white marble, still showing distinctly its fragmental character. The Canadian marble is not a breccia, but a dense, solid formation with the coloring matter forming an integral part of the ground mass. This means a graceful, flowing pattern and a natural blending of colors, rather than an almost artificial building up of broken fragments.

Another point must be taken into consideration. In the brecciated marbles, the metamorphic action that transformed the amorphous limestone into a crystalline marble undoubtedly preceded the cataclysm that broke the stone into fragments. Much of the cementing material that gives the coloring is, therefore, not perfectly metamorphosed. It does not take the polish of the true marble, but shows in rather dull streaks over the surface. In the South Stukely deposit the coloring matter was present during metamorphism and so has become a part of the entire crystalline structure. The polished surface is uniform and the stone seems absolutely homogeneous.

The introduction of green, of course, differentiates this stone from the Italian marbles named. It gives a hint of the Greek Tinos and Cippolin, and also of Campen Vert. No matter how crude mankind may be in his combinations and contrasts, nature is never inharmonious, and all the colorings blend into an exquisite color scheme. While the amount and shades of color vary in the different parts of the quarry and in the separate beds, the effect of all the marble is harmonious, and there are no two blocks but would yield slabs that could be combined without a discordant note in any single room or wainscoting.

The varieties produced at this quarry are as follows: Rose Royale, a combination of rose and white; Verte Royal, light green in color, somewhat similar to Cippolin; Jaune Royal, similar to light Mazzano, but without the pink tints of the latter; Royal Dominion Blue, a strongly marked variety, showing considerable gray and blue blended together into striking patterns; Royal Violetta, similar to Breche Violette; Royal Veined White, a white variety with light gray markings.

The Stukely deposit is located about a mile and a half from the South Stukely station on the Canadian Pacific Railway, some seventy-three miles from Montreal, and a branch from the main line has been built which runs to within a short distance of the quarry. The deposit, which is vertical, is of sufficient extent to supply any possible demand for generations to come. Within close proximity to the present opening it has been proved by core-drilling that there are over 50,000,000 cubic feet of marble. The quarry is on a hillside, and the colors, which are distinctly separated, permit of convenient operation. The unusual soundness of this deposit for a colored marble must strike every visitor. The quarry equipment is up-to-date in every particular.

In addition to the quarry, the Dominion Marble Company, Limited, have established a sawing mill and finishing plant on the canal bank at Montreal, just past the Turcot plant of the Canadian Car & Foundry Company. The site is very conveniently located and the shipping facilities by either rail or water are excellent. There is a railroad siding from the main line of the Canadian Pacific Railway and the Grand Trunk Railroad leading directly to the factory of the company and the blocks of marble from the quarry are unloaded from the cars by an electric travelling crane of 35 tons capacity. The plant of the company is one of the finest in the country. The buildings, which are 165x135 ft., are of brick and steel construction and all the machinery has been installed on very heavy concrete beds. The sawing equipment consists of six gang saws of the latest and most approved pattern, and the system of handling the blocks is a very convenient one. The finishing plant consists of carborundum machines, pneumatic tools, rubbing beds and polishing machinery, all of the latest pattern, which provide for finishing the product in the best possible manner. There is ample room for future development on the land owned by the company and additions can be made from time to time as required, without disturbing any of the present equipment. The machinery is run by electric power obtained from one of the local power companies, and, in addition, there are twin boilers of 250 h.p. capacity, which would permit of the plant being operated by steam at very short notice.

The Dominion Marble Company's office is located on the second storey of the factory building and they have agencies in the leading cities of the Dominion, where samples of their product can be seen. The men interested in this concern are all well known in commercial circles and the future of the enterprise seems assured.

Handling and Shipping Facilities at Dominion Marble Company's Plant

Steel Company's Extensions

With a view to anticipating business development as far as possible, the Steel Company of Canada, Limited, have decided to make the following large additions to their Hamilton plant: one 34-in. two-high blooming mill; one four-stand continuous mill; one two-strand rod and bar mill, and two basic open hearth fifty-ton furnaces, with soaking pits. These furnaces will increase their output of open hearth steel to 500 tons daily. The mill will practically double the finished bar capacity.

The demand for concrete bar reinforcement has increased greatly during the last few years and the company will carry a large stock of various sizes and lengths of cold twisted steel bars. The twisting of a bar cold insures uniformity of twist and is a physical test on each bar. The elastic limit runs about 60,000 lbs., or about sixty per cent. to one hundred per cent increase over the bar before twisted. In consequence of the increase, considerably less steel is required. Cold twisting removes the scale from the bar thereby permitting closer union with the concrete.

The company manufacture [illegible] and straightened wire at both their Hamilton and Montreal plants. In consequence of the demand for prompt shipment of this material for concrete reinforcing they have been compelled to carry heavy and varied stocks. Wire products, such as copper wire, trolley, telegraph and telephone wire, galvanized wire, are all products of their Montreal factory. On account of their increased capacity for these products, they are in a position to handle all orders promptly. They have recently added considerably to their Fence Department and are manufacturing "Invincible Fencing," an extra heavy fence, particularly adapted for farm and railroad work, which will be purely a product of their own manufacture from their own basic open hearth steel. Fencing from this grade of steel is particularly non-susceptible to rust.

The Buffalo Meter Company, Buffalo, N.Y., have published their 1912 catalogue of American and New Niagara water meters and accessories. The booklet is illustrated and contains ample descriptive matter and information for buyers. The company's products have survived the tests of time and efficiency and need no introduction at our hands. In addition to water meters, the company manufacture several appliances for the convenient and inexpensive setting and operation of meters.

At a meeting held in Victoria, B.C., the formal organization of the Pacific Great Eastern Railway Company, chartered at the last session of the Provincial Legislature, to build a line of railway from Vancouver to connect with the Grand Trunk Pacific at Fort George, was completed and directors named as follows: Messrs. Timothy Foley, D'Arcy Tate, John W. Stewart, Donald McLeod, Patrick Welch and Vernon W. Smith. After the general by-laws of the company had been introduced and passed, it was decided that it should at once proceed to secure offices in Victoria, where the headquarters of the corporation will be situated. The officers were subsequently elected as follows: Mr. J. W. Stewart, president; Mr. Timothy Foley, vice-president; Mr. Patrick Welch, vice-president and general-manager.

Mr. W. J. Hynes, the well known Toronto plastering contractor, has organized the firm of W. J. Hynes, Limited, to carry on and extend the business which he has built up during the last thirty or forty years. In forming the company Mr. Hynes has associated with himself men who have been with him for a number of years and who are thoroughly competent to handle the increased responsibilities entailed by the rapid growth of the business, while the personal supervision of Mr. Hynes will, of course, continue as in the past. The officers of the company are as follows: Mr. W. J. Hynes, President and General Manager; Mr. Wallace Haney, Vice-President and Contract Superintendent; Mr. R. M. Case, 2nd Vice-President and Shop Superintendent and Mr. Edward W. Miller, Secretary-Treasurer. The field of work covers every department of modern plastering, viz., metal and wood furring and lathing and construction work, and plain and decorative plastering in all materials. The manufacture of architectural relief decorations in staff, cements, and in fact, practically all plastic materials, has long been an important branch of Mr. Hynes' business and the new company proposes to extend and widen its activities along this line. Models of every variety and for all purposes are made to details supplied or from original designs and the fact that contracts for relief decorations are being executed for shipment to cities as far apart as Edmonton, Alta., Winnipeg, Man., and Charlottetown, P.E.I., shows the wide range of the work. The Hynes, Limited Company [illegible] of business and an enlarged plant is one of the early plans of development now under consideration.

Personal News and Notes

[illegible] by the city of Toronto during [illegible] $1,100,000. The [illegible].

[illegible] engineers and contractors, [illegible] removed from the Stair Building to a larger [illegible] Street.

[illegible] companies we note the Interlocking Concrete Construction Company, Limited, Vancouver, B.C., capitalized at $100,000.

The architect's perspective reproduced on this page is a view of the building which is to be erected at Montreal for the Canadian General Electric Company and which is [illegible] company and the Canada Foundry Company, Limited. The building will contain five storeys and basement and will be replete with every modern convenience for facilitating the discharge of business. The architects are Messrs. Ross & MacFarlane.

The death is announced in Montreal of Mr. Louis Bourgouin, a retired contractor, 71 years of age. The late Mr. Bourgouin erected La Presse Building and rebuilt the Villa Maria Convent.

Mr. Meadows, Engineer of the Province of Quebec Board of Health, has been asked by the town of Longueuil to prepare plans and specifications for three large filters. The residents are dissatisfied with the water now supplied.

At Calgary, by-laws will be submitted to the ratepayers in May for the extension of the surface sewerage system, at a cost of $300,000; for additions to the street railway $88,000, and for improvements to parks and cemeteries, $95,000. Preference for concrete bridges is expressed by most of the city aldermen. Plans and specifications for the first four to be constructed of that material, fix the cost at $1,720,000, which is 30 per cent. greater than the cost of steel structures of similar capacity.

As reported recently in these columns, an uniform contract form has been adopted in the province of Alberta. Ten thousand copies of the new forms are being printed for distribution among architects' associations and the various builders' exchanges.

The city of Vancouver has a minimum wage of $3 a day for civic employees. City Engineer Fellowes recently came in for some criticism at the hands of the council for placing street sweepers on the wage schedule at $2.80 a day. Mr. Fellowes was over-ruled and the $3 wage sustained.

CANADIAN GENERAL ELECTRIC CO.

Canadian General Electric Company's Proposed New Building at Montreal

The resignation of City Engineer Hanes of North Vancouver, B.C., has just taken effect and the duties of the office have been assigned to Assistant Engineer West until an appointment is made. A sketch of Mr. Hanes' career is published in this issue.

Mr. Charles H. Allen, late chief of construction of the Peter Lyall Construction Co., Ltd., Montreal, has been presented with a silver tea service, on resigning his position. The gift was made by his associates and friends in the city.

It is expected that tenders for the construction of the new Welland canal, which is estimated to cost $45,000,000, and for which $10,000,000 will probably be appropriated in next year's estimates, will be called next June and that actual operations will be under way in the autumn.

The Advance Machine Works, Limited, of Walkerville, Ont., manufacturers of Northern Cranes in Canada, announce change of name to Northern Crane Works, Limited, Walkerville, Ont. The new plant of the company is now in operation, and is located on Argyle Road and Essex Terminal, Walkerville. The company reports the plant well filled with electric and hand power crane work and electric hoist work.

A party of engineering students is leaving London, Eng., on April 19, on a tour of the United States and Canada. The itinerary includes New York, Philadelphia, Washington, Chicago, Pittsburg, St. Louis, Denver, San Francisco, Vancouver, Winnipeg, St. Paul, Toronto and Quebec.

May 1st is the date fixed for the turning of the first sod of the proposed C.N.R. tunnel in Montreal. There is to be considerable ceremony with the function, and the sod is to be turned by a prominent official of the company, probably Sir William Mackenzie.

The City of Westmount have accepted an offer of $80,000 for the sale of their property comprising the city hall, the police and fire quarters and yard, and seven lots of land. A special committee has reported in favor of putting the wires underground. There will be 10,000 miles of wire to be dealt with.

Mr. Wm. Storrie, who has been Assistant Engineer on the Toronto filtration plant under City Engineer Rust, has been engaged with the city of Ottawa to superintend filtration works in that city. Mr. Storrie is a graduate of the Glasgow Technical College and is an Associate Member of the Institute of Civil Engineers.

Mr. A. H. Dimock, City Engineer of Seattle, is stated to have been offered the post of City Engineer of Victoria, B.C., at a salary of $7,500 a year. His present salary at Seattle is $5,000 a year. The resignation of Mr. Angus Smith, the present City Engineer of Victoria, has been in the hands of the council for some time and will take effect on May 1.

The town of Verdun will spend $405,000 on improvements, $160,000 of which will be on the extension of the electric and water service to householders, and the balance in macadamizing streets and the construction of sewers. The town is now turning out 250 tons of crushed stone for macadamizing, the stone being obtained from the aqueduct of the Montreal Water and Power Company.

Mr. D'Arcy Tate, Vice-President of the Pacific Coast Eastern Company, was recently in Victoria arranging the details of his firm's undertakings. The company's head office will be at Victoria, although the engineering and maintenance headquarters will probably be at Vancouver. The company now has men out making a preliminary survey of the proposed route. The company is also making an examination of the Pemberton & Howe Sound line, which is to be taken over by the Pacific Great Eastern. There will be no delay in getting to work on construction.

"Farm Improvements" is one of a number of interesting periodicals published by the Canada Cement Company, Limited. A copy just to hand contains a number of articles which should be of outstanding interest to the agricultural man. There is an article on tile drainage which is intensely practical and covers every phase of construction in a most helpful manner. Announcement is made in this issue of a prize contest in which there are four awards, ranging from $50 to $10.

The Hedden Construction Company, New York City, is about to enter the Canadian field, Mr. E. H. Becket having been appointed general manager. The company have carried out some of the largest contracts on the American continent, the aggregate cost amounting to many millions of dollars. Among the buildings erected are the famous Metropolitan tower and the other structures of the Metropolitan Company in New York, in addition to the City Investing Building. The company are now commencing the construction of a sixty-storey tower for the Prudential Life Assurance Company, New Jersey. It may be added that some of the most extensive building operations in the world have been financed and carried through by the Hedden Construction Company, who have already had experience in Canadian work. The policy of the company will be on the same lines as that adopted in the United States, where the greater portion of the business has been done on a percentage basis with a guaranteed price. The company have offices in the Board of Trade, Montreal.

We have received from Messrs. W. & L. E. Gurley, of Troy, N.Y., a copy of their 1912 catalogue and price list of civil engineers and surveyors' instruments. This catalogue is an abridged form of the company's manual and supersedes all previous editions. Messrs. Gurley carry an exhaustive line of instruments, attachments and all accessories, and engineers, architects and builders will be well advised to secure a copy of this catalogue and to study the latest developments detailed therein. There are copious photographs and the numerical arrangement of the catalogue facilitates ready reference.

Mr. Robert Bennett, Fireproofing Contractor

The building by-laws of many cities in Canada and the United States have recently been amended in regard to fireproof construction and in nearly all cases the use of porous terra cotta is favored. The city of Toronto has been well to the fore in encouraging this construction and within the last few years many fine buildings have been erected and fireproofed in this manner. Mr. Robert Bennett, of Toronto, who has been successful in obtaining a number of the more important fireproofing contracts, reports exceptional activity. Among his more recent contracts may be mentioned the Upper Canada Bible Society's Building, the new Hobberlin Building, Independent Glass factory, Bell Telephone Company's Building on Logan avenue, Laurence's Brewery, the Lincoln Paper Mills at Merritton, the O'Keefe Brewery Company's new building on Victoria street, Toronto, and no less than nine school buildings for the Toronto Board of Education. The porous terra cotta tile used on Mr. Bennett's contracts is manufactured exclusively by the Don Valley Brick Company of Canada. Mr. Bennett employs a large staff of competent workmen. He has resided in Canada for nearly thirty years, has been a resident of Toronto for nine years and is a member of the Toronto Builders' Exchange.

Mr. Robert Bennett, Toronto

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Amherst, N.S.

The town contemplates spending $20,000 this summer on concrete sidewalks. Town Clerk, H. F. Donkin.

Calgary, Alta.

Tenders are called for concrete work for construction of Eastern section of the C.P.R. company's irrigation block, Alta. Materials except for forms furnished by company. Approximate quantities are: 15,000 cu. yds. concrete, 1,200,000 lbs. reinforcing steel. Quantities in individual structures vary from 5 cu. yds. to 700 cu. yds. Chief Engineer, A. S. Dawson.

Chester, N.S.

The town will spend $50,000 on a water service this summer. Tenders will be called shortly. Secretary, F. S. [illegible]

Fergus, Ont.

Plans will be prepared for complete new water works system. New equipment will be required.

Fredericton, N.B.

The city engineer, Mr. Feeney, is calling for tenders for a new boiler for waterworks and pumping station. Plans and specifications may be seen at the engineer's office.

Ottawa, Ont.

The city of Ottawa contemplate installing a 16-in. water main to cost $10,000. Engineer in charge, N. J. Ker, City Hall.

Tenders are called until April 30th for paving on McLeod street. Trinidad Lake asphalt on 6-in. concrete foundation; approximate quantities are asphalt 9560 sq. yds., gutter 12-in. wide, wooden headers 200 lin. feet. On Musgrove street: 6-in. con. fndn., 2-in. asphalt and ¾-in. of binder. Approximate quantities asphalt 675 sq. yds. and 405 lin. ft. of gutter. Received by Board of Control until April 30th inclusive. Plans and specifications at office of N. J. Ker, engineer. Cheque for 5 per cent. of amount must accompany each tender.

St. Thomas, Ont.

The Board of Health has recommended the construction of a 24-in. sewer on Elm street and an 18-in. sewer to the septic tanks. Engineer, M. H. Baker.

Southampton, Ont.

Tenders will be received at the town of Southampton until May 31st for the laying of 500 ft. of 15-in. sewer pipe along the lake shore. Plans and specifications from Bowman & Connor, civil engineers, Berlin, Ont., or 36 Toronto Street, Toronto.

Stanley Township, Ont.

Tenders for drainage work estimated at 30,500 cu. yds., will be received until May 15th, 1912. For further information write Jno. E. Harnwell, Clerk. Varna, Ont.

Stratford, Ont.

The city council has recommended the construction of sewers on Trinity, Cambria, St. Vincent and John streets, also are contemplating the purchase of a street oiler.

Windsor, N.S.

The ratepayers have voted to expend $32,000 on sewage extensions including building of dam and laying new pipe and extension to water system. Mayor, H. W. Sangster.

By-law will be prepared for submission as soon as possible to obtain $30,000 for putting down new sidewalks.

Wolfville, N.S.

The town will expend $15,000 this summer on street pavements. Town clerk, A. E. Coldwell.

CONTRACTS AWARDED

Manotick, Ont.

Concrete walks. Contractor, Aug. Gaefte & Sons, Manotick, Ont. Engineer in charge, R. Gamble, Secy.

Port Arthur, Ont.

Paving to cost $84,263.05. Engineer, L. M. Jones. Gen. Contractor, National Paving Co., Winnipeg and Port Arthur. 22,519 sq. yds. of paving; 8,766 lineal ft. of curbs and gutter.

St. Thomas, Ont.

Contract is awarded to A. E. Ponsford for cement walks and curbs. 26 running feet for curbing, 11½ sq. ft. for sidewalks at 13c. sq. ft. for combination. Specifications may be seen at Engineers office. Engineer, M. H. Baker, St. Thomas.

Winnipeg, Man.

The contract was awarded to Kettle River Co. for paving 730 sq. yds. with sandstone paving blocks at 2.50 per sq. yd. Engineer, H. N. Ruttan, 223 James Avenue, Winnipeg.

Railroads, Bridges and Wharves

Brandon, Man.

Work will be commenced shortly on improving C.P.R. yards, six new stalls in round house beside other improvements. Work will be under direct supervision of general superintendent and divisional engineer. Gen. Supt., D. C. Coleman; Div. Engineer, J. Holden.

Calgary, Alta.

Tenders are called for 2 steel bridges, span 125 ft.; 4 steel bridges, span 100 ft.; 14 steel bridges, span 75 ft.; 9 steel bridges, span 60 ft. The C.P.R. will supply piers, abutments and all concrete work. Chief Engineer, A. S. Dawson.

Cornwall, Ont.

Tenders are called until April 26th for improvement of lower lock No. 15 for Dominion Government, Dept. Railways and Canals. Secretary, L. K. Jones. Plans and specifications may be seen at office of the chief engineer of the Dept. at Ottawa, or at office of the resident engineer of the Ontario & St. Lawrence Canals at Cornwall, Ont., to be accompanied by marked cheque for $6,500, payable to the order of Minister of Railways and Canals, forfeitable if tenderer decline to enter into contract. Cheques thus sent will be returned to respective contractors whose tenders are not accepted, otherwise will be held as part security for due fulfilment of the contract to be entered into. The lowest or any tender not necessarily accepted.

Fredericton, N.B.

Tenders will be received addressed to the Department of Public Works until May 6th, 1912, for the dredging of the waterfront at Fredericton, N.B. Tenders must be accompanied by cheque of 5 per cent. of amount of tender. Tenders must include the towing of dredge and scow to and from work. Plans and specifications may be had from the secretary's office in Ottawa and from the engineer in charge at Fredericton, N.B. Department of Public Works; Secretary, R. C. Desrochers, Ottawa.

Hamilton, Ont.

The Interlakes Company Limited, Toronto, solicitors Mewburn & Ambrose, Spectator Building, will build new wharves here; capital $2,000,000.

Honeywood, Ont.

The council will meet to consider the advisability of constructing a number of new concrete and iron bridges this summer. Owner, Township of Mulmur. Reeve, Mr. Lawrence, Honeywood P.O.

Hull, Que.

City Engineer of Hull has prepared plans showing proposed site for new C. P. R. station in Hull, at Junction of Front and Brewery streets.

Ivan, Lobo Township, Ont.

Tenders will be received by F. W. Farncombe until May 1st for concrete abutments and steel superstructure to be built at Ivan and three smaller concrete bridges to be built in Lobo. James McNair, Commissioner, Lobo. Engineer in charge, F. W. Farncombe, London.

Kentville, N.S.

The Dominion Atlantic Railway Co., Kentville, a subsidiary company to the C.P.R. will build steel bridges at Bear River, N.S., and at Hortonville. For further information write to the company at Kentville, N.S.

Leamington, Ont.

The big docks were badly damaged in an ice jam and portions were moved three feet out of alignment. Extensive repairs will be undertaken immediately.

For further information write to the Mayor of Leamington.

London, Ont.
The council have decided to spend $9,000 in repairing the breakwater. Engineer, Geo. Wright.

Medicine Hat, Alta.
Medicine Hat Electric Railway Co. are planning a line to run from Medicine Hat to Elkwater Lake, 40 miles, 4 ft. 8 in. guage, 56 pd. steel. Full plans and specifications are now complete awaiting approval of Medicine Hat voters. Cost $500,000.

Moose Jaw, Sask.
Sealed tenders marked "Tenders for Subway" addressed City Commissioners, Moose Jaw, will be received until noon, April 30, 1912, for the construction of a reinforced concrete subway under the C. P.R. tracks on 11th avenue.

Ottawa, Ont.
Plans are being prepared for freight sheds to cost $28,100 on Broad street, for C.P.R. Co. Architect, District Engineer, Broad street. Buildings to be 20 x 40, 300 x 40, and 300 x 50, concrete foundation.

Parrsboro, N.S.
The town contemplates spending $12,000 on the construction of a dam. Town clerk, H. G. Smith.

Riverview, Ont.
Three new bridges will be required, iron and reinforced concrete. Repairs to be made on account of damage by floods for Melancthon township, Dufferin county. Reeve, Thos. J. Dryden, Riverview P. O.

Saskatoon, Sask.
Sealed tenders addressed to the City Commissioners will be received until noon, May 17th for furnishing material and construction of superstructure for 23rd street subway. Lowest or any tender not necessarily accepted. For further information write either of the the engineers: City Engineer, G. T. Clark; Bridge Engineer, W. L. McKenzie, (C.N.R.)

Sault Ste. Marie, Ont.
Sealed tenders addressed to secretary and endorsed "Tender for Widening Lower Entrance Channel Way, Sault Ste. Marie Canal," will be received until Friday, May 10th. Plans and specifications may be seen at the office of the chief engineer, Ottawa, and at Sault Ste. Marie, in the office of the Engineer-in-charge, accompanied by an accepted bank cheque for the sum of $2,500 made payable to the order of Minister of Railways and Canals. Dominion Government, Department of Railways & Canals; Secretary, L. K. Jones.

Wingham, Ont.
Repairs will be made to the dam which is badly damaged in the recent flood. This work will necessitate a large quantity of concrete being used. Write to Mayor Spotton for further information.

CONTRACTS AWARDED

St. Thomas. Ont.
Work has started on car barn to cost $10,000 for London & Lake Erie Transportation Co. 1-storey, concrete foundation, brick and cement construction, electric light, machinery for repairing, electric traction cars will be required.

West Toronto, Ont.
Freight sheds to cost $10,000, for C. P. Railway. Gen. Contractor, Jno. Hayman, London. 1-storey, 200 x 40, concrete construction, electric light, office equipment, scales, heating apparatus etc. will be required.

Weyburn, Sask.
Passenger station to cost $60,000 for Canadian Pacific Railway. Divisional Engineer, T. Martin, Moose Jaw. Gen. Contractor, J. McDermid Co., Winnipeg, Man. 1-storey, stone and brick, steam heating, electric light, pitch and shingle roofing. Specifications with resident engineer, at Regina. Div. engineers at Moose Jaw and Winnipeg.

Wolfville, N.S.
Railway station for Dom. Atlantic Ry., Kentville, N.S. General Manager, P. Gifkins. Gen. contractor, Rhodes, Curry & Co., Amherst, N.S.

Public Buildings, Churches, Schools, etc.

Arborg, Man.
Tenders are called for erection of a school for Arborg School District. Sec. treasurer, J. P. Palsson. 1-storey, 2 rooms, 40 x 48, stone foundation, frame shingle roofing. Received by secretary treasurer until May 1, 1912.

Chatham, Ont.
Tenders are called for theatre to cost $25,000 on King street for The Chatham Theatre Co. Ltd. Architect, J. L. Wilson & Son. 2-storey, 55 x 120, concrete foundation, fireproof construction, steam heating, electric lighting, composition roofing, interior finish of plastic relief work. Ventilating systems and electrical decorations. Received by architects —close April 30th.

Dunnville, Ont.
Plans will be prepared to replace Methodist Church destroyed by fire. Complete new equipment required including organ. Estimated cost $7,000.

Fort William, Ont.
Sealed tenders will be received by the chairman of Works Committee on or before May 15th, 1912, for the complete installation (including buildings), of a 50-ton incinerator plant. Forms of tender may be had on application to engineer. Cash deposit of 10 per cent. of the cost of plant will be required, to be returned to contractors on completion of three months period of operation. Lowest or any tender not necessarily accepted. City Engineer, Jas. Wilson.

Galt, Ont.
Stewart & Witton, 2 Hughson street S., Hamilton, are preparing plans for Collegiate Institute which will cost about $15,000.

Guelph, Ont.
The Board of Health are contemplating the erection of a public Abbatoir and have asked the city council to report on the matter immediately. Information on this subject required by Bd. of Health. Cost $50,000.

Hamilton, Ont.
Tenders are called for (First Methodist) Church. Sec. Building Committee, Thos. S. Morris, 58 East avenue S. Plans and specifications with Dr. D. D. Smith, Main and Victoria avenue, Hamilton. Cheque equal to 1 per cent. of amount must accompany tender. Lowest or any tender not necessarily accepted. Received by Dr. Smith until April 29th, 1912, for bulk or separate tenders.

Secretary R. H. Foster, City Hall will shortly instruct A. W. Peene, 2 King st. west to prepare plans for 8-room addition to school on Barton street to cost $40,000. Chairman, Board of Education, J. W. Lamoreaux, Tuckett Tobacco Co.

Lake Manitou, Que.
Plans are being prepared for sanitorium for Morrels Manitou Mineral Co. Traders Bank Bldg., Montreal. President, Dr. Morrell. Architect, Ross & Macfarlane, 928 Union Bank Bldg.

London, Ont.
Congregation of Wellington street Methodist Church are planning extension to Sunday School to cost $15,000. Pastor, Rev. H. A. Graham, London. Superintendent, Wm. Jeffery. 2-storey, stone foundation, brick construction, electric lighting.

Medicine Hat, Alta.
Tenders are called for store and lodge room to cost $30,000, Toronto street, for Odd Fellows Lodge. Architect, W. T. Williams. 2-storey, 100 x 50, cement foundation, cement hollow block and stone, steam heating, gas lighting, gravel roofing, maple flooring. Received by architect until April 30th.

Tenders will be called after May 1st for school to cost $20,000, for Medicine Hat Separate School Board. Architects, W. T. Williams. 2-storey and basement, concrete foundation, brick and stone construction, hot air heating, gas lighting, shingle roofing, maple flooring. Modern ventilating system required. Received by architect until May 15th.

Mildmay, Ont.
A new church to cost $60,000 will be erected here. Stone foundation, brick and stone construction, complete new equipment including seats, organ, railings, etc. All information may be obtained from Bishop Dowling, 354 King street west, Hamilton.

Montreal, Que.
Plans are being prepared for arcade to cost $3,000,000, Metcalfe and Peel sts. for J. C. McGreevy Syndicate, 58 Commercial Union Building, Montreal. Architect, Marchand & Haskill, 164 St. James street. Tenders will be received by architects in about 3 weeks. For further information write architect.

Tenders are called for city hall annex to cost $10,000,000. Architects, Marchaud & Haskill, 164 St. James street. Plans and specifications from architects or City Engineer.

Niagara Falls, Ont.
The Board of Morrison street Methodist Church, minister, H. D. Robb, sec., J. H. Jackson, architects, Bond & Smith, Toronto, are contemplating the building of a new church.

North Bay, Ont.
Plans are in preparation for library to cost $20,000 for Public Library Board, North Bay. Architect, H. W. Angus, North Bay. 2-storey and basement 42 x 65, stone, brick and steel construction, hot water heating, electric lighting, patent roof, hardwood flooring.

Ottawa, Ont.
The [illegible] Church [illegible] are considering plans for a $40,000

[illegible] at Metcalfe and McLaren streets. Architects will be appointed and definite plans made.

Funds are at present being raised to build a new addition to present Y.M.C.A. building at cost of $40,000. A branch at Hortenburgh, Ottawa, is also to be built at a cost of [illegible]

Plans are ready for fire hall to cost $25,000 on Arthur street. Architects, F. C. Sullivan, Sparks street, Ottawa. 2-storey and tower, 85 x 42, stone foundation, solid brick construction, hot water heating, electric lighting, tar and gravel roofing. Main floor to have a hose wagon, engine, ladder truck and 8 stalls. Second floor to have hay-loft, dormitory, recreation room, captain's room, District Chief's office, balcony on second floor front.

A new Custom House building, it is definitely announced by Public Works Department will be built on Sussex street site. The building will be 5 storeys high and cost about $300,000.

Architect F. Sullivan has plans under way which provide for forty new class rooms and two new schools with all modern equipment for the Separate School Board.

Owen Sound, Ont.

Tenders are called for public library to cost $20,000. Architect, Forster & Clark, Owen Sound. Dimensions 40 x 90. Received by secretary of Library Board.

St. Lambert, Que.

St. Barnabas Anglican Church have bought land on which to build a new church.

Sarnia, Ont.

The Board of Education will have plans prepared for a new 10-roomed school on Lochiel street; 2-storey, stone foundation, brick construction, slate rfg., furnaces. Seats, blackboards, desks, and interior equipment needed. Cost $40,000.

Vancouver, B.C.

Tenders are called for club building for Vancouver Club. Architects, Sharp & Thompson, 336 Hastings west. Architects will immediately get out working plans and specifications for contractors' figures. Work of tearing down the old building and arranging temporary quarters for the Club will also be started at once. Contractors have not yet arranged for demolishing of the present building.

Walkerville, Ont.

Plans are in preparation for church to cost $30,000, for Roman Catholic Church. Priest, Father Robert. Architect, John R. Boyd, Detroit, Mich. Church 48 x 96. Preliminary sketches being made by John R. Boyd. Architect, Detroit, Mich.

Waterloo, Ont.

Jos. E. Seagram has plans ready for parish hall which he will erect as a memoriam in connection with St. Saviours Church. All information may be obtained from him. Estimated cost $5,000.

Weyburn, Sask.

Tenders are called for Collegiate Institute to cost $175,000. Secretary, J. C. Jarrett, Weyburn. Architect, Ross & Macfarlane, Winnipeg. 2-storey, 70 x 125, stone foundation, solid brick construction, tar and gravel roofing, steam heating, electric lighting, fir trimming, maple flooring, fan system to be installed. Tenders received by secretary until May 10, 1912. Plans and specifications may be seen at office of G. J. Jarrett, Weyburn, Sask., Builders' Exchange, Winnipeg, Man., and Regina, Sask.

Windsor, Ont.

Extensions to Students Dormitories to cost $8,000 are contemplated at Kings Collegiate High School. For further information write Principal F. T. Handsombody.

Winnipeg, Man.

Tenders are called until April 29th for the erection of a weigh scales building to cost $4,125. Specifications may be seen at the office of Robert Ridd, Market superintendent, Winnipeg. Engineer in charge, H. N. Ruttan, 223 James avenue.

Plans have been changed and new tenders are called for school extension on Hampton street for Britannia School Board. Architect, E. D. Tuttle, 701 McArthur Block. 2-storey and basement, 70 x 200, stone foundation, brick and stone construction, steam heating, electric, asbestos and slate roofing, maple flooring. Received by architect until April 30th.

CONTRACTS AWARDED

Calgary, Alta.

School to cost $146,000 for Calgary School Board. Architect, H. McLellan, City Hall. Gen. Contractor, Jones & Smith, Calgary, $125,000. Plumbing and heating, Grant Bros., $21,000, 3-storey, 190 x 190, concrete foundation, stone front and brick, steam heating, electric light, fireproof throughout.

Hamilton, Ont.

Moving picture theatre to cost $12,000, cor. Barton and Leeming streets, for F. Guest Co., Barton street, Leeming avenue. Architects, Stewart & Witton, 2 Hughson street W. Contract let to: Masonry, Jno. Tope, 218 Charlton ave. W. Carpenter work, Bremner & Penny, 106 John street N.

St. Patrick's School to cost $49,000, Victoria avenue, for Separate School Bd. Chairman, James Redding, 14 Main st. E. Secretary, Rev. Father Maloney, St. Mary's Cathedral. Bulk contract let to Thomas Launders, 80 Chatham street. Architect, L. A. Wardell, 110 Bay street, S. Work will start at once.

Medicine Hat, Alta.

Nurses' Home, to cost $10,000, Main street, for General Hospital. Architect, W. T. Williams. General contractor, Hotson & Leaders, Medicine Hat. Two-storey, concrete foundation, brick and hollow block construction, steam heating, gas lighting, fire escapes.

Montreal, Que.

Church to cost $60,000, Dorchester st., for Calvary Congregational Church, Mtl. Architect, Robert Findlay, 10 Phillips Place. Brick and masonry, Reid McGregor & Reid, 668 St. Catherine street west. Carpenter, Simpson & Peel, 10 Benoit street.

Church basement to cost $35,250, Rolette street, for Fabrique Ste. Cecile, 2963 Drolet street. Architect, Edgar Prairie, 502 St. Catherine street E. Gen. contractor, N. Allard & Fels, 359 Providence Lane. 1-storey, 82 x 160, masonry foundation, stone construction, hot water heating, temporary roof.

School on Esplanade street for Protestant School Board, Peel street, Montreal. Architect, Nobbs & Hyde, Beaver Hall Hill, Montreal. 3-storey, fireproof, 24 class rooms. Contract for plumbing, heating and ventilation awarded by the Canadian Domestic Engineering Co. Ltd. to D. A. Bethune, 483 Bleury street, Montreal.

North Bay, Ont.

School to cost $30,000. Architect, H. W. Angus, N. Bay. General contractor, Henderson & Hughes, N. Bay. Mason contractor, W. A. Martin, N. Bay. 2-storey and basement, 68 x 96, stone foundation, solid brick and stone, steam heating, electric lighting, patent roofing, pine flooring.

Ottawa, Ont.

Extension to Lady Grey Hospital on Carling avenue. Architect, A. L. Weeks, 126 Sparks street, Ottawa. General contractor, W. G. Adamson, 126 Sparks st. 2-storey and basement, concrete foundation, frame, solid brick and reinforced concrete, steam heating, electric lighting, pitch and shingle roofing.

Club building to cost $60,000, Elgin and Albert street for The Laurentian Club (E. R. McNeil). Architect, A. L. Weeks, Canada Life Bldg., Ottawa. Gen. contractor, Shuttleworth & Black, Ottawa. 4-storey and basement, 64 x 99, concrete foundation, reinforced concrete, brick, Indiana stone, steam heating, electric lighting, tar and gravel roofing.

Pratts Siding, Ont.

Work will commence shortly on a new four-roomed brick school. All seats and interior equipment needed. General contractor, McPherson & Clark, Pratts Bldg. Cost $4,500.

St. Laurent, Que.

Fire station to cost $10,800. Architect, J. D. Viau, St. Gabriel street, Montreal. Contractor, James Dorais, St. Laurent. 2-storey and basement, 36 x 65, concrete foundation, brick encased construction, hot water heating, electric lighting, gravel roofing.

Residences

Calgary, Alta.

Plans are in preparation for residence to cost $4,000, Royal Simalta, for Stubbs & Wallace, 1324 12th avenue west. 2-sty., 26 x 32, concrete foundation, brick veneer construction, hot air heating, electric light, shingle roof, hardwood trim.

Dawn Valley, Ont.

Albert Wills is planning to erect a new residence to cost $3,500; 1½-storey, 30 x 35, cement foundation, brick construction. Work will start shortly.

London, Ont.

W. Webster, Mgr. Featherstone Factory, 291 Clarence street is preparing plans and will start work as soon as possible on erection of a residence on Dundas street to cost $5,000. 2-storey, 40 x 30, stone foundation, brick construction, electric lighting.

A. J. Denney, 610 Dundas street, is contemplating the erection of apartments to cost $25,000. 4-storey, 30 x 50, stone foundation, brick construction, steam heating, electric lighting, gravel roofing. Interior equipment will be needed.

Montreal, Que.

Plans are in preparation for 3 flats to cost $5,000, Garnier street, for Arsene Frenette, 212 Fabre street. 3-storey, 26 x 77, stone foundation, pressed brick construction, hot water heating, gravel roofing.

Plans are being prepared for residence to cost $20,000, Rosemount ave., for Lyon Cohen, 36 Prince street. Architect, Hutchison, Wood & Miller, Royal Insurance Bldg. 2-storey and attic, 34 x 64, masonry foundation, solid brick and stone construction, hot water heating, electric and gas lighting, slate roofing, oak finish, Norman style of architecture, 4 fire-places, steel beams, solid brick or stone verandahs, front & back; billiard room in basement, bay window reception room as conservatory.

North Bay, Ont.

Tenders are called for residence to cost $15,000, for Geo. Gordon. Architect, H. W. Angus, North Bay. 3-sty. and basement, 40 x 60, stone foundation, brick, stone and steel construction, hot water heating, electric lighting, shingle roofing, hardwood flooring, tile work for vestibule, bath rooms, conservatory and fire place.

Ottawa, Ont.

Plans are being prepared for dwelling to cost $4,500 on Goulbourne avenue, for J. F. Tradburks, 91½ Sparks street. 2-storey, 16 x 40, stone foundation, brick veneer construction, electric lighting, gravel roofing.

St. Isidore, Que.

Extensions will be made to residence to cost $6,000 for La Fabrique St. Isidore. Architect, Jephium Jolieveur, St. Isidore. 36 x 40, brick wall construction, hot water heating, galvanized iron roof, gasoline or acetylene, hardwood trim. Tenders received by Rev. A. Rouleau, St. Isidore.

Toronto, Ont.

Plans are being prepared for apartment house to cost $25,000, Gloucester street near Church, for J. M. Cowan (in trust) 65 Adelaide street. Architect and builder, J. M. Cowan, 65 Adelaide street. 3-storey, stone foundation, steam heating, felt and gravel roofing, electric ltg., structural steel, hardwood finish. Tenders open about April 25th.

Plans are ready for apartments to cost $28,000, King and Jamieson, for S. King, 185 Spadina avenue. Architect, Redmond & Beggs, Kent Building, Toronto. Brick, hot water heating, electric lighting, felt and gravel roofing.

Geo. E. Baycroft, 13 Fairview road, is excavating for 9 residences to cost $30,000, Pape avenue near Harcourt. 2-sty., 193 x 100, shingle roofing, hot air heating, electric light.

Plans are ready for 6 residences to cost $18,000, 31-37 Homewood avenue, for W. A. Forster, 12 Grove avenue. Architect, J. H. Stanford, Bloor and Ossington avenue. 2½-storey, brick, shingle roofing, hot air heating, electric ltg.

Work will start shortly on residence to cost $6,000, St. Johns road and Law street, for Dr. T. H. Norman, 24 Woodside avenue. Architect, P. R. Wright, 332 Clendennan avenue. 2-storey, brick, electric lighting, hot water heating, shingle and slate roofing, hardw[illegible] and trimmings, stucco (two rooms) lath.

Tenders are open for apartment to cost $6,000, Laburnam avenue, for M. A. Ford, 96 Dunn avenue. Architect, and builder, Mallory & Thatcher, 31 Queen street west, Toronto. 2-storey, brick construction, shingle, felt and gravel roofing, hot water heating, electric ltg. Tenders will be received by architects.

Vancouver, B.C.

Tenders will be received by Architects Parr, McKenzie & Day, 570 Granville street, for erection of an 8-roomed residence to cost $7,000.

Windsor, Ont.

Plans are in preparation for residences to cost $24,000, for Osterhout & Little. 12 new houses, 1½-sty., electric ltg. furnaces, plumbing and all general interior appointments will be required.

Winnipeg, Man.

Tenders are called for residence to cost $8,000, for D. Marrin. Architect, Ross & MacFarlane, Union Bank Bldg., Vancouver. 2-storey, 35 x 36, stone foundation, brick construction, steam heating, electric light, shingle roofing. Received by architects until the 30th April.

Plans are being prepared for apartments on Yonge street. Architect, Edgar Prain, 313 Fort street. 3-storey and basement, 50 x 110, stone foundation, solid brick construction, steam heating, electric lighting, tar and gravel roofing, fir and maple floors.

CONTRACTS AWARDED

Calgary, Alta.

Plans are ready for 2 residences to cost $5,600, for J. G. Porteous, 618 24th avenue west. Contractor is owner. 2-storey, 24 x 32, concrete foundation, frame construction, electric light, hot air heating, shingle roofing.

Residence to cost $6,600, Mt. Royal, for S. F. Wilson, 9th avenue west. Contractor, W. G. & G. Baptie, 333 11th avenue west. 2-storey, 36 x 29, concrete foundation, brick and stone, stucco, steam heating, electric light, shingle roofing, hardwood floors.

Residence to cost $6,000, Mount Royal, for A. Johnson. Architect and contractor, Alliance Investment Co. 2-sty., 36 x 32, concrete foundation, frame, electric lighting, hot air heating, shingle roofing.

Residence to cost $8,000, for D. V. Cape, 8th avenue west. General contractor, R. F. Baxter, 912 19th avenue west. 2-storey, 36 x 40, concrete foundation, frame construction, hot water heating, shingle roofing, hardwood floors.

Apartment block to cost $25,000 for M. Alex. Mortin, 8th avenue E. Architect, Holman & Gotch, Herald Block. Gen. contractor, Lyhle & Jones, 71 Centre avenue. 3-storey, 58 x 50, concrete foundation, solid brick construction, electric light, steam heating, tar and gravel roofing.

Galt, Ont.

Contract is awarded for residence to cost $5,000, Lansdowne avenue, for A. S. Taylor, Galt. Architect, J. Evans, Galt. Contracts:—Mason, Sibley & Miller, Galt. Carpentry, Peter Nicol. Painting and glazing, Ben. Goodfellow, Galt. Plumbing and heating, Scott & Bennett, Galt. [illegible] stone foundation, red brick construction, electric and gas lighting, hot water heating, [illegible] roofing.

Hamilton, Ont.

Residence to cost $12,000, [illegible] avenue, for J. F. Stuart, 284 Locke st. Contractor is owner and architect. Plbg. contract, Goodram Bros., 89 Charlton avenue west. Sewers contract, J. J. Armstrong, 48 Burris street. Mr. Stuart will build a brick house with all modern appliances.

Contract is let for residences to cost $12,500, on Cumberland avenue, to Seymour & McKay, 34 Burris street. Plbg. and hot water heating contract, Goodram Bros., 398 Charlton avenue west. The above will build two brick houses with all modern conveniences.

Residences to cost $6,000, Sherman and Maple avenues, for W. A. Freeman, 142 Elgin street. Contractor, Jas. Bryers, 31 Burris street. Pressed brick, cut stone, slate roof, hardwood finish, hot water heating, combination fixtures, refrigerator, etc.

Residence to cost $5,000, Sherman ave. S., for R. Rowell, Elgin street. Contractor, Jas. Bryers, 1 Burris street. Pressed brick, cut stone, slate roof, hot water heating, hardwood finish, combination fixtures, etc.

Kenora, Ont.

Residence to cost $16,000, for Wm. G. Cameron. Architect, Ross & MacFarlane, Union Bank Bldg., Winnipeg. General contractor, Staines & Ferguson, 447 Rosedale avenue, Winnipeg. 2½-storey, 40 x 40, solid brick, stone foundation, vapor steam heating, electric ltg., shingle roofing.

Montreal, Que.

Residence to cost $6,000, Highlands & Cote St. Antoine road, for J. B. Duhamel, 127 Girouard Blvd., St. Hyacinthe, Que. Architect, Chas. Bernier, 70 St. James street, Montreal. General contractor is proprietor. 2-storey, 35 x 56, concrete foundation, La Prairie pressed brick, hot water heating, electric lighting, gravel roofing.

Work will start shortly on 2 residences to cost $10,000, Vendome avenue, for R. Crombie, 103 Grey avenue. Architect, W. Price, c/o 103 Grey avenue. General contractor is proprietor. 2-sty., 23 x 45, masonry foundation, brick construction, hot water heating, electric light.

Dwelling to cost $6,000, St. Hubert street, for E. J. Chartiez, 464 St. Hubert street. Architect, Chas. Bernier, 70 St. James street. General contractor, Alfred Pion, 38 Marquette street. 2-storey, 25 x 65, concrete foundation, stone construction, hot water furnace, gas and electric lighting, cement and gravel roofing.

Work has started on residence to cost $3,000, Cartier street, for Wilfrid Chicoyne, 1142 Bordeau street. General contractor is proprietor. 3-storey, 25 x [illegible] construction, gas lighting, gravel roofing.

Work [illegible] $20,000, Redpath street, for H. Yule, 508 Coristine Building. Architects, Mac[illegible]. Plastering, Gray & Wighton, 244 Pine [illegible]. Walker Hardware Co., Ltd., 252 St James street. Arch. iron, Fred A. McKay, 18 St. George street. Brick, Reid [illegible] Catherine street E. Masonry, same. Painting and glazing, W. J. Ryan, 604 Victoria avenue. Roofing, Richardson, Simard & Co., 129 Elgin street. Ironwork, Dominion Bridge Co., Ltd., La [illegible] Que. [illegible]-storey, 43 x 57, stone foundation, brick construction, hot water heating, gas and electric lighting, mansard slate roof.

Work has started on 2 residences to cost $7,000, Draper avenue, for Chas. Fyfe, 137 Park avenue. General contractor is owner. 2-storey, 50 x 40, concrete foundation, brick construction, hot water heating, gas and electric light, gravel roof.

Work has started on 3 flats to cost $10,000, on Hubert street, for A. Deschamps, 1308 St. Hubert street. Contractor is owner. 3-storey, 33 x 44, stone foundation, stone construction, brick, hot water heating, electric lighting, tar and gravel roofing.

Outremont, Que.

Cottage to cost $4,800 on Bloomfield avenue, for John Nault, 2180 Hutchison street. General contractor, Labelle & Forgue Ltd., Montreal. 2-storey, 20x53, concrete foundation, rustic brick construction, hot water heating, electric light, gravel roofing.

Work has started on a cottage to cost $9,000 for J. A. Lamarche, 364 De L'Epee. Architect, R. Charbonneau, 15 St. James street. Contractor is owner. 2-storey, 31 x 65, stone foundation, stone construction, hot water heating, gas and electric light, tar and gravel roofing.

Ottawa, Ont.

Residence to cost $5,000, Powell ave., for Carl Engles. General contractor, Geo. Eaman & Son, Osabella St., Ottawa. 3-storey, 31 x 34, stone foundation, brick veneer construction, shingle roof, electric light.

Plans are being prepared for dwelling to cost $5,000, Regent street, for C. S. Gunn, 121 Chamberlain street, Ottawa. General contractor is owner. 32 x 42, stone foundation, double brick veneer construction, electric lighting.

Plans are in preparation for residence to cost $5,000 on Clemow avenue, for J. W. Nimmo, 209 Carling avenue. Gen. contractor is builder. 3-storey, 17 x 39, stone foundation, brick veneer construction, electric light, steam heating, shingle roofing. He will also erect a brick $8,000 house on 1st avenue.

Work has started on a residence to cost $6,000, Powell avenue, for Mr. Kemp. Mason contractor, Cowie & More, Ottawa. 3-storey, stone foundation, brick veneer construction, electric lighting, shingle roofing.

Residence to cost $33,000, Daly ave., for F. F. Ahearn, Albert street, Ottawa. General contractor, Holbrooke & Sutherland, Ottawa. Carpenter, Smith Bros., Ottawa. Painting and glazing, Howe & Co., Ottawa. Plumbing and heating, J. McLennon, Bank street, Ottawa. Electrical work, Costello & Crowe, Ottawa. Marble and tiling, Sanitary Tiling Co., Montreal. 2½-storey, 81 x 49, stone foundation, brick construction, electric lighting, pitch roofing. Basement to contain coal, billiard, store, boiler room and laundry. Plans and specifications at architect's office.

Apartment house to cost $63,000 on Gloucester street, for E. R. McNeil, 54 Cartier street. Architect, A. L. Weeks, 229 Sparks street. General contractor, W. G. Adamson, 126 Sparks St. Plbg. and heating, M. N. O'Connell, 212 Gloucester street. 3-storey and basement, 48 x 92, concrete foundation, solid brick and steel frame construction, steam heating, electric lighting, tar and gravel roofing.

Plans are ready for residence to cost $4,500, Oakland avenue, for J. A. Gierson. Contractor, Robert R. McKinstry, 91 Second avenue. 3-storey, 24 x 36, stone foundation, brick veneer, electric light, shingle roof.

Work is in progress for apartments to cost $18,000 for A. Bell, Saskatoon. General contractor is owner. 2-storey, 40 x 44, concrete foundation, frame construction, electric light, vacuum steam heating, pitch and gravel roofing, fir trim.

Simcoe, Ont.

Residence to cost $9,000. General contractor, Fred Draper. 1½ and 2 storeys. stone foundation, brick construction, electric light. Mr. Draper will build six new houses and will start work on them as soon as possible.

Dwelling to cost $8,000, for Chas. Tunis, Simcoe. General contractor, Fred. Draper, Simcoe. 2-storey, dressed brick construction, stone caps and sills, gas or electric lighting, gas heating, slate roofing, interior finish in hardwood.

Work has started on a residence to cost $4,000 for Harold McCall. 2-sty., cement foundation, brick construction, gas heating, pine finish, gas lighting.

Toronto, Ont.

Foundations are started for dwelling to cost $14,000, 2 avenue road, for J. J. Grafton, Warren road. Architect, Chadwick & Beckett, 20 Toronto street. Builder, Davidge & Lunn, 684 Bathurst street. Masonry and stone, Davidge & Lunn. Carpentry, Maxwell & Finch. Roofing, Duffy & Son. Plastering, Hodson & Warren. Plumbing and heating, Purdy & Mansell. Brick and stone, brick foundation, shingle, hot water htg., gas and electric lighting, cut or art stone, hardwood floors.

Residence to cost $8,000, College Hts., for R. B. Bond, Ulster Apartments, Tor. Contractors, Scott & Switzer, 38 Laughton avenue, W. Toronto. Architect, H. B. Gilbert, 47 Wellington street E. 45 x 39, stone construction, shingle roofing, hardwood floors, hot water heating, electric lighting, two bath rooms, 3 fire places, garage and separate tanks.

A permit has been granted for dwelling to cost $5,000, Logan avenue. Architect, J. W. Gray, Confederation Life Building. Builder is owner. 2½-storey, 27 x 110, brick, hot air heating, gas ltg.

Alterations to residence to cost $10,000, at 28 Avenue road, for Sir Mortimer Clark, Confederation Life Bldg. Architect, J. Wilson Gray Confederation Life Bldg. Builder, Browne & Love. Masonry, Brown & Love. Stone work, Brown & Love. Carpentry, G. S. Langskill, 354 Huron. Plastering, Hind. Plumbing and heating, Jno. Ritchie, 56 Adelaide street. Brick and stone, stone foundation, slate roofing, hot water htg., electric lighting, hardwood floors, separate piece for vacuum cleaning, tile floors in bath.

Plans are ready for residence to cost $7,000, Heath street near Yonge, for Gordon Taylor, 24 Heath street. Architect, Mitchell & White, 65 Isabella St. Builder is owner. 2½-storey, brick, hot water heating, electric lighting, hardwood stairs, shingle roofing, 3-in. weeping tile around outside of wall, steel beams over large windows.

Residence to cost $6,500 on Shaw St. Builder, D. Schwalm, 198 Ossington ave. Architect, E. A. Wilson, 77 Victoria st. 2½-storey, 50 x 125, brick and stone, frame foundation, slate and shingle rfg., hot water heating, electric light, hardwood finish.

F. E. Gibson, 53 Woodlawn avenue, is excavating for 6 dwellings to cost $42,000, McClennan avenue, near Summerhill. Architect, W. White. Builder, Owner. Brick construction, stone foundation, shingle roofing.

Plans are ready for flats to cost $6,000, Sherbourne near Earle, for L. A. Delaplante, Balsam avenue. Architect, E. R. Conlon, 802 Lumsden Building. Builder is owner. 2-storey, 30 x 40, brick, hot water heating, electric lighting, shingle roofing, mantles, tile floors in vestibule, hardwood finish.

Dwelling to cost $10,000 on Baker ave. for F. E. Gibson, 53 Woodlawn avenue. Architect, Thompson & Belfray. Builder, Jas. Gibson. 2½-storey, shingle roofing, hot air heating, electric lighting.

Walkerville, Ont.

Contract is awarded for residence and garage on Devonshire road. for Hiram Walker, Jr. Architects, Burrows & Wells, Detroit, Mich. Excavation, H. Lowe, Walkerville. Carpenter, V. Williamson, Walkerville. Roofing, V. Williamson, Walkerville. Iron work, Canadian Bridge Co., Walkerville. Satinette Varnish Works of Chicago will supply paints and oils for varnishing and interior decorating, also liquid granite and Johnson's prepared wax.

Westmount, Que.

Residence and stable to cost $21,000, Metcalfe street, for L. Rodier, 344 Mountain street. Architect, W. A. Gagnon, 46 Beaver Hall Hill. General contractor, T. Lessard & Sons, Ltd., 191 Craig street E. Mr. Rodier contemplates building a residence and stable.

Winnipeg, Man.

Apartments to cost $40,000 on Burrows avenue, for W. Chapman, 590 Burrows avenue. Contractor, S. Brynjolfsson Co., Builders Exchange. Architect, D. Abramovitch, 505 McIntyre Blk. 2-storey, 66 x 92, brick, stone foundation, steam heating, electric lighting, felt and gravel roofing, fir and hardwood floors.

Apartments to cost $30,000, Jessa and Ainsley streets, for H. Peterson. Architect, E. W. Crayston, 572 Ross avenue, Winnipeg. Gen. contractor, S. Brynjolfsson & Co., Builders Exchange, Winnipeg. 3-storey and basement, 46 x 108, 6-ft. stone wall above ground level, stone foundation, red brick and stone, felt and gravel roof, steam heating, electric ltg., fir and maple floors.

Business Buildings and Industrial Plants

Alvinston, Ont.

J. C. Bimdner is having plans prepared for a beet sugar factory and new equipment will be required.

Angus, Que.

The Brampton Pulp & Lumber Co., Angus, Que., will build a new pulp mill this spring. For further information write head office.

Berlin, Ont.

Synder Bros. Upholstering Co. will build an addition to their factory with all modern equipment. Tenders are called.

S. Nordheimer is planning to erect a factory 3-storey, 60 x 200, brick construction, steam heating, electric light. Cost $25,000. Ratepayers will vote to loan firm $15,000 for 10 years, on condition that factory is built.

Courtright, Ont.

W. R. Leach, Mooretown, is planning salt works to cost $50,000. Stone foundation, brick construction, electric ltg., Mr. Leach is preparing plans for new salt works, complete new machinery and new equipment will be required immediately.

Fergus, Ont.

The Canadian Cereal Co. will have plans prepared at once for new building to replace the one destroyed by fire. Complete new machinery will be required. 2-storey, 45 x 50, brick construction. Cost $40,000.

Galt, Ont.

Architects Stewart & Witton, 2 Hughson street S., Hamilton, are preparing plans for four storey addition to factory of R. McDougall pump manufacturers company to cost $10,000.

Guelph, Ont.

The Guelph Carpet Co. are contemplating additions to their carpet mills. 3-storey, 60 x 60, with carpet machinery to be installed.

Hamilton, Ont.

Tenders are called for 3 stores and apartments to cost $25,000, Barton and Earl streets, for H. C. T. Smith, 21 Stirton street. Architect, Ed. C. Fisher, 21 Stirton street. 3-storey, brick, each suite to have 6 rooms and bath, stationary tubes built in kitchen, main entrance doors operated by electric device, intercommunicating phone system, hot water heating, electric lighting.

Plans are in preparation for remodelling of Simcoe Hotel to cost $12,500 on King street East, for Biggar & Gauld. Architect, A. G. Peene, 2 King street E. Proprietor, Geo. Stockford, Hamilton. A garage to cost $2,500 will be erected in the rear.

London, Ont.

Geo. Heaman will prepare plans for a new factory, woodworking machinery required. Building to be brick construction and to have electric light. Cost $4,500

Battlecreek Foods Co., President, A. A. Campbell, have plans under way by Architects Moore & Munroe, London, for a new factory. 4-storey, 150 x 100, stone foundation, brick, cement and steel construction, steam heating, electric light. Complete new machinery will be required.

Medicine Hat, Alta.

The Dominion Glass Co., Wallaceburg, Ont., will erect a new glass factory to cost $100,000. This plant is to be a duplicate of the company's present plant at Wallaceburg. Construction to be of corrugated iron and steel, thoroughly fireproof.

The Medicine Hat Steel Co. will erect a plant for the making of nails, bolts, nuts, etc., also open hearth steel furnaces. Construction to be of iron and steel, absolutely fireproof. Cost $500,000.

Alberta Foundry Co. contemplate an extension to rolling mill to cost $15,000. 25 x 100, corrugated iron, gas ltg. and heating. Machinery plans not ready yet.

Union Bank contemplate the erection of large bank and office building to cost $40,000. Plans and specifications now being prepared.

W. R. Hull, Calgary, will erect a business block to cost $75,000. Architect, F. J. Lawson, Norman Block, Calgary. 3-storey, 125 x 130, concrete foundation, gas and hot air heating, gas ltg., tar and gravel roofing. Tenders received by architect until April 30, 1912.

E. McKay, Bellingham, Wash., U.S.A. is contemplating the erection of a glass factory to cost $25,000. Construction to be corrugated iron, steel and absolutely fireproof. Machinery for up-to-date factory will be purchased.

Montreal, Que.

D. W. Ogilvie & Co., 11 St. Sacrament street, Montreal, have bought St. Joseph's Hall property on St. Catherine street, for $115,000, area 57 x 100, and intend erecting office building on the site.

Work will start on building to cost $1,000,000 on St. Alexander street, for Alexander Syndicate Ltd., c/o L. G. Read, 282 St. Catherine street west. Architect, Ross & Macfarlane, Belmont St. 10-storey, 300,000 ft. floor space, concrete foundation, brick and stone on steel frame construction, steam heating, electric lighting, concrete and gravel roofing, 4 freight elevators and 4 passenger elevators, reinforced concrete floors, metal windows, fire tower of new design. All modern appointments.

Niagara Falls, Ont.

Tenders are called for erection of steel work (stores and offices) on Queen street, for J. C. Gardener, 10 Morrison street, Niagara Falls. 3-storey, 50 x 112, concrete foundation, steel framework, reinforced concrete walls, felt and gravel roofing, steam heating, electric lighting, maple and birch flooring, metallic ceilings, steel sashes, reinforced steel and concrete stairway, metallic lath.

North Bay, Ont.

Plans are in preparation for bakery and store to cost $7,500 for J. H. A. Taylor, North Bay. Architect, H. W. Angus, North Bay. 2-storey and basement, 33 x 90, stone foundation, solid brick and steel construction, hot water heating, electric lighting, patent roofing, [illegible] equipment for bakery required.

Ottawa, Ont.

Campbell Bros. are contemplating the erection of a steel and iron plant on Carling avenue. Buildings to be 100 x 110, concrete foundation, brick wall, tile and slate roof. Plans will be prepared immediately.

Port Arthur, Ont.

Tenders are called for offices and telephone exchange to cost $15,000. Architect, Hood & Scott. 3-storey, 32 x 50, concrete foundation, brick, steel beams, hot water heating, electric ltg., oak and maple floors, fire escapes and passenger elevator.

Sarnia, Ont.

J. Peterson, Hotel Northern, is planning additions to hotel to cost $15,000. 3-storey, 40 x 50, brick construction, electric lighting, shingle roof. Work will be started as soon as possible and complete new equipment required.

Saskatoon, Sask.

Cushing Bros. intend enlarging present mill and expect to have 100 more men in their employ. The additions will be of frame and concrete construction and metal shingles.

Plans are being prepared for new hotel to cost $150,000, avenue B and 20th street, for James Barrey. Architects, Thompson, Daniels and Colthurst. Reinforced concrete construction, brick and terra cotta facing. The above architects will receive tenders and all information may be received from them.

Thetford Mines, Que.

The Thetford Metal Works expect to enlarge their present plant this summer and will also form a new limited company for extension of business and will put in fifteen thousand dollars of new machinery.

Thorold, Ont.

Tenders are called for extension to paper mill to cost $250,000 for Montrose Paper Mills. Architect, D. Albertson, Thorold. 3-storey, concrete foundation, brick ant reinforced concrete construction, steam heating, electric lighting, gravel and composition roof, wood and cement floors. Received by Montrose Paper Co. until May 1st, 1912.

Toronto, Ont.

Plans have been prepared for addition to building to cost $15,000, 282-4 Yonge street, for Dr. C. R. Cuthbertson, 180 Bloor street west. Architect, Redmond & Begg, Kent Building. 2-storey, brick, electric lighting, hot water heating, structural steel, sky-lights, fire escapes, hardwood finish, felt and gravel roofing. Tenders received by owner.

Tenders are called for factory to cost $10,000, 146 Brock avenue, for Sovereign Perfume Co., Ltd., Queen and Duncan streets. Architect, E. B. Varey, Nina and Lyndhurst avenue, 2-storey, 300 x 47, stone foundation, brick and stone construction, gravel and pitch roofing, electric lighting, steam heating, stone sills

Walkerton, Ont.

The Canadian Hardware & Saddlers Steel Goods Co. contemplate erecting a new factory to cost $25,000. 2-storey, brick construction, electric light. Plans will be prepared at once and complete new machinery, boilers, engine, etc., will be needed.

Wiarton, Ont.

Selmon Bros., Wiarton, plan to instal additional machinery in their saw mill and contemplate building an addition to their present plant.

Windsor, Ont.

R. J. Graham is contemplating the erection of a factory to cost $8,000. Brick foundation, brick construction, metal trusses. To be built this coming summer.

CONTRACTS AWARDED

Berlin, Ont.

Extension to [illegible] to cost $14,000, Foundry street, for Berlin

(Continued on page [illegible])

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver 429 Pender Street

Tenders for Church

Separate and bulk tenders for the various works in connection with the construction of a Methodist Church edifice and S. S. room in the Town of Oshawa, Ont., will be received up to noon on **Saturday, May 4th, 1912**, by John Bale, Esq.

Plans and specifications may be seen at the office of Robt. McCaw, Esq., Oshawa, by Friday, April 19th. Lowest or any tender not necessarily accepted.

A. R. GOYNE,
17 Rec. Steward.

Machinery for Sale

The following are a few of the items appearing in our big Spring Bulletin of used machinery for sale:

One No. 1 Vulcan Full circle swing traction shovel 5/8 or 3/4 yd. dipper.

One No. 0 Thew 5/8 yd. dipper.

Two No. 3 Thew 1½ yd. dipper.

One Little Giant traction shovel 1¼ yd. dipper.

One No. 28 Marion traction shovel ⅝ yard dipper.

Two 65-ton Bucyrus 2½ yd. dipper.

Two 90-ton Marion 3½ yd. dipper.

One 9 x 15 Blake Crusher.

One 10 x 10 Indiana Crusher, Portable.

One No. 10 McCully with screen and elevator.

One No. 7½ McCully with screen and elevator.

1 No. 6 Gates with screen and elevator.

Two No. 5 McCully manganese fitted with screen and elevator.

Two No. 3 McCully manganese fitted with screen and elevator.

One No. 3 Gates—screen and elevator.

Ten 1½ yd. Dump Cars.

Sixty 2 yd. Dump Cars.

Sixty-five 3 yd. Dump Cars.

Forty 12 yd. Dump Cars.

One ¾ yd. Owen clam shell bucket.

One ¾ yd. Williams clam shell bucket.

One 2 yd. Hayward clam shell bucket.

Large and small belted and steam driven compressors, hoisting engines—all sizes with or without boilers.

Write for spring bulletin, just out, which gives complete list. Marsh Co., Old Colony Bldg., Chicago, Ill. 17-tf

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Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 382, Winnipeg. 11-23

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

TOWN OF BERLIN

TENDERS

Sealed tenders will be received by the undersigned up to **noon of the Second day of May**, for the construction of a reinforced concrete bridge over the creek on Courtland avenue in the Town of Berlin, span 16 feet, width 60 feet.

Plans and specifications may be seen at the office of the Town Engineer, Berlin.

The lowest or any tender not necessarily accepted.

A. H. MILLAR,
17-18 Town Clerk.

Contractors' Plant For Sale

Consisting of:—

3 complete Derricks (one stationary),
1 50 h.p. Locomotive Boiler.
2 40 h.p. Locomotive Boilers.
3 "Leonard" Engines, 7, 20 and 25 h.p.
1 18 h.p. Rocker Arm Engine.
2 No. 2 Ransome Concrete Mixers, complete with Boilers and Engines—with wheels to run on track.
1 15 h.p. "Marsh & Henthorn" Hoist.
1 20 h.p. "Manson" Hoist.
1 No. 5 "Smart Turner" Centrifugal Pump, direct connected, complete with suction and fittings.
1 8-in. "Gould" Centrifugal Pump, direct connected with 10-in. suction, complete with fittings.
1 8-in. "Gould" Centrifugal Sand Pump, direct connected with 8-in. suction, complete with fittings.
1 4 x 6 in. Martin Duplex Pump.
1 7½ x 7½ in. Martin Duplex Pump.
2 Small Duplex Pumps, 2½ in. suction.
2 No. 2 McDougall Diaphragm Pumps.
2 20 h.p. Upright Boilers.
1 No. 5 Ohio Hopper Vertical Gas Engine with fittings.
1 Wilson Flare Light.
1 Milburn Flare Light.
31 Gasoline Torches.

Band saw, forge, anvil and fittings for blacksmith and carpenter shop.

A number of 1½ and 1¼ c. y. side dump cars; "Koppel" ¾ c. y. steel cars, all 24-in. gauge.

1 Water tank 7 ft. dia. and 7 ft. high, with fittings.

A large quantity of shafting, sprocket wheels, belting, scrapers, wagons, tools, etc.

Information and prices at
Room 1307 Traders Bank Bldg., TORONTO.
16-17 Telephone Main 7123

Machinery for Sale

One only D. C. Generator, 25 h.p. 19 kw., 250 volts, 1100 rev. One only D. C. Motor, 15 h.p., 12 kw., 250 volts, 1100 rev. Both in first class condition. Will sell at sacrifice to ensure a quick sale. Apply at once to the Gold Medal Furniture Manufacturing Co., Limited, Lumber Department, VanHorne & Bartlett streets, Toronto. 5

City of Moose Jaw, Sask.

Tenders for Paving

Sealed tenders marked, "Tenders for Paving," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon of **Wednesday, May 15th, 1912**, for the laying of approximately 34,000 square yards of pavement.

Plans, specifications and any further information may be obtained from J. Antonisen, City Engineer.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT
W. F. HEAL
17-19 City Commissioners.

Township of North Easthope

Tenders Wanted

Sealed tenders, marked "Tenders for Kuhne Drain," will be received by the undersigned up to **Saturday, May 4th, 1912**.

Plan, profile and specifications can be seen at the Clerk's Office, Amulree, or at John Rogers' Office, Mitchell.

The Kuhne Drain commences on Lot 25, Con. 7, and has its outlet in the Avon River on Lot 38.

A deposit of $200 is required on the Drain Contract, cash or marked cheque.

The council will meet on Monday, May 6th, at Amulree, at 2 p.m., when the tenders will be opened and considered.

The lowest or any tender not necessarily accepted.

J. D. FISHER,
Clerk North Easthope, Amulree P.O.
Clerk's Office, Amulree, April 13, 1912. 17

TOWN OF WHITBY

Sealed tenders, addressed to F. Rogers, Chairman, will be received by the Water and Light Commissioners up until noon, **May 8th**, for the whole or part construction of the following works:

(a) Filtering basin in sand on beach of Lake Ontario at pump house, with storage capacity of 120,000 gallons.

(b) Concrete intake well, at least 16 feet deep and with a storage capacity below zero lake level of at least 16,000 gallons.

(c) 500 feet of gallery filtration system extending from proposed intake well, with a storage capacity of at least 90,000 gallons.

(d) Labor laying all interconnecting piping, including depression of present intake pipe to conform to proposed well.

(e) Labor laying 4043 feet of 8-inch main for extension of water works system.

(f) Supplying of all pipes and specials for above works.

Tenders must state time of completion of contract. Any further information will be furnished by applying to

GEO. W. P. EVERY,
Supt. Water and Light,
17-18 Whitby, Ont.

City Engineer Wanted

Applications will be received by the undersigned up till twelve noon on **Thursday, the ninth day of May, 1912**, for the position of City Engineer of North Vancouver.

Applicants to state experience, qualifications and salary expected.

THOMAS SHEPHERD,
City Clerk,
16-19 North Vancouver, B.C.

CITY OF MOOSE JAW
SASK.

Tenders for Subway

Sealed tenders, marked "Tenders for Subway," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon on **Tuesday, April 30th, 1912**, for the construction of a Reinforced Concrete Subway under the Canadian Pacific Railway Company's tracks on Eleventh Avenue.

Plans, specifications and any further information may be seen at the office of the "Contract Record," 220 King Street West, Toronto.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. H. HEAL, City Commissioners.
Moose Jaw, April 6th, 1912.
16-17

Department of Railways and Canals, Canada

Saulte Ste. Marie Canal

Notice to Contractors

Sealed tenders, addressed to the undersigned and endorsed "Tender for widening Lower Entrance Channel-way, Sault Ste. Marie Canal," will be received at this office until 16 o'clock on **Friday, May 10th, 1912**.

Plans, specifications and form of the contract to be entered into, can be seen on and after the 10th of April, 1912, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Engineer in Charge, Sault Ste. Marie, Ont., at which places form of tender may be obtained.

Parties tendering will bbe required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $2,500 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,

L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, April 8th, 1912.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.—21126. 16-17

Concrete Mixer Wanted

Wanted to rent or purchase, second-hand, half-yard Concrete Mixer. Must be in first-class condition and cheap. Reply to J. Hilton, 70 Oxford street, Hamilton, Ont. 17-18

TENDERS

For Drainage Work

Stanley Township

Tenders for Drainage Work of by-law 11-1911, estimated at 30,500 cubic yards, will be received by the undersigned up to May 15th, 1912.

Copies of by-law sent on application.

JOHN E. HARNWELL,
Clerk of Stanley Township,
16-18 Varna, Ont.

Plant for Sale by Tender

The following machinery and apparatus in first-class running condition, is offered for sale by the Water and Light Commissioners, Whitby, Ont.:

1 John Inglis Corliss Engine, 16 x 36.
1 Wheelock Engine, 10 x 28.
1 Bullock 2-phase Generator, 2200 volt, 60 cycle, 100 kw., direct connected to exciter.
1 marble switchboard, 2 panel, complete with ammeters, voltmeter, rheostats, switches, separate phase regulator, and transformer 50 kw., 3500 to 2500 volts.

Also countershaft with bearings, pulleys, clutch couplings, and belts.

The above has run for about seven years, giving every satisfaction, but has now been displaced by hydro-electric power. The plant may be seen in operation by any prospective purchaser.

Tenders to be addressed to
F. ROGERS, Chairman,
W. and L. Commissioners,
17-18 Whitby, Ont.

Canadian Pacific Railway Company

Department of Natural Resources

Tenders for Timber Structures

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Timber Structures," will be received up to noon of **May 15th, 1912**.

The work to be let includes the timber structures in about half the area of the Eastern Section of the Company's Irrigation Block in Alberta.

Approximate quantities are 4,250,000 feet B.M. of timber and 80,000 cubic yards of excavation. All construction materials will be furnished by the railway company.

Plans, specifications and full information will be furnished on application to the undersigned. A deposit of $50.00 will be required before plans, etc., will be given out, which will be refunded on their return in good condition.

All proposals must be accompanied by a certified cheque, payable to the undersigned, for five per cent. (5 p.c.) of the amount of tender, to be forfeited as liquidated damages should the the bidder neglect or refuse to enter into a contract if the work is awarded to him.

All proposals must be made on the standard [illegible] Any alterations thereto, interlineations or qualifying of prices may invalidate the proposal.

The right is reserved to reject any or all bids and to waive defects.

A. S. DAWSON,
Calgary, Alta., April 15, 1912.
16-18 Chief Engineer.

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good monep in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

Notice to Contractors

Tender for Pumping Machinery

High Pressure Pumping Station
Slater Street, Ottawa

Sealed tenders addressed to the Chairman of the Water Works Committee, endorsed "Tender for Pumping Machinery," will be received by the Secretary of the Water Works Committee, City Hall, Ottawa, up to 5 p.m. **Tuesday, May 14th, 1912**, for the supply and installation of two electrically operated pumping units each having a capacity of 2,000 Imperial gallons per minute.

Any tender received after the above stated time will be declared informal.

Specifications and full particulars may be obtained on application at the City Engineer's office, City Hall, Ottawa.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
17 City Engineer.
Ottawa, April 19, 1912

Department of Railways and Canals

Ontario—St. Lawrence Canals, Cornwall Canal

Sealed tenders, addressed to the undersigned and endorsed "Tender for Improving Lower Entrance to Lock No. 15," will be received at this office until 16 o'clock on **Friday, April 26th, 1912**.

Plans, specifications and form of Contract to be entered into can be seen on and after April 8th, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $6,500.00 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,

L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, April [illegible]

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 16-17

To Contractors

[illegible] will be received [illegible] May 9th, [illegible] Public [illegible] Ont.

[illegible] Architects, Forster & Clark's office, 887 Second Avenue East.

[illegible] necessarily [illegible]

[illegible]

[illegible] Chairman of the Board

Notice to Contractors

Tenders Wanted

Tenders marked "Tenders" will be received by W. J. Bellamy, Township Clerk, Flesherton, for the construction of a reinforced concrete culvert on the road between lots 150 and 151, con. 2, North East Artemesia. Also for the filling of the embankment where it has been washed away.

Tenders will be received for the work complete or for each part separately.

Plans and specifications can be seen at the office of W. J. Bellamy, Township Clerk, Flesherton, or I. Traynor, Engineer, Dundalk.

The lowest or any tender not necessarily [illegible]

Tenders will be opened at 2 o'clock p.m. on May 4th, 1912, at the Township Hall, Flesherton.

T. R. McKENZIE, Reeve
I. TRAYNOR, Engineer

The City of Fort William

Garbage Incinerator

Tenders sealed and endorsed "Tenders for Garbage Incinerator," and addressed to the Chairman of the Works Committee will be received on or before the **15th day of May, 1912**, at the office of the City Clerk, for the complete installation, including all buildings, of a fifty (50) ton incinerator plant and the operation of same for a period of three months after completion.

Forms of tender, on which all bids must be submitted, may be obtained from the office of the City Engineer.

A cash deposit of ten per cent. of the cost of the plant will be required, and same will be returned to the contractors on the completion of the three month period of operation.

The lowest or any tender not necessarily [illegible]

JOHN WILSON,
City Engineer.
[illegible] 11, 1912 16-19

CITY OF EDMONTON

Tenders for Nelson Ave. Trunk Sewer

[illegible] be received by the undersigned up to 6 o'clock, **April 30th, 1912**, for the construction of a Reinforced Concrete Sewer.

Envelopes containing tenders must be marked "Tender for Trunk Sewer."

Specifications may also be seen at the Toronto offices of the Contract Record, the Canadian Engineer, Toronto, and the Engineering News, New [illegible]

A deposit of ten ($10) dollars will be required for each set of specifications and plans.

All tenders must be accompanied by a certified cheque for one per cent (1 p.c.) of the value of the contract.

The right is reserved to accept or reject any or all tenders.

CITY COMMISSIONERS,
Office of the City Engineer,
Edmonton, Alta., April 2, 1912. 15-17

CITY OF SASKATOON

Tender for Superstructure 23rd Street Subway

Sealed tenders, addressed to the City Commissioners, and endorsed "Tender for Superstructure 23rd Street Subway," will be received up to twelve o'clock noon on **Friday, May 17th, 1912**, for furnishing material for and construction of Superstructure 23rd Street Subway.

The Corporation reserves the right to reject any or all tenders. All information may be obtained on application to W. L. MacKenzie, Bridge Engineer, C. N. R., Winnipeg, and George T. Clark, City Engineer, Saskatoon.

JAS. CLINKSKILL,
W. B. NEIL,
E. M. SNELL, City Commissioners.
Saskatoon, April 9th, 1912. 16-17

Books for Sale

A number of books of interest to engineers and contractors are offered for sale at about one half their cost. Among them are the following:

Reinforced Concrete, 590 pages, by Albert W. Buel, C.E. Publishers, The Engineering News Publishing Co., New York.

Chemistry and Physics of Building Materials, 350 pages, by Alan E. Munby. Publishers, Constable & Co., London, Eng.

Principles of Reinforced Concrete Construction, 320 pages, by F. E. Turneaure and E. R. Maurer. Publishers, Jno. Wiley & Sons, New York.

Treatise on Masonry Construction, 740 pages, by Ira Osborn Baker. Publishers, Jno. Wiley & Sons, New York.

Baldwin on Heating for Buildings, Revised 16th Edition, 400 pages, by Wm. J. Baldwin. Publishers, Jno. Wiley & Sons, New York.

Cement Laboratory Manual, 120 pages, by L. A. Waterbury. Publishers, Jno. Wiley & Sons, New York.

Light and Heavy Timber Framing Made Easy, 395 pages, by Fred T. Hodgson. Publishers, Frederick J. Drake & Co., Chicago.

Practical Concrete Block-making, 75 pages, by Chas. Pallister. Publishers, Industrial Publication Co., New York.

Short Cuts in Carpentry, 90 pages, by Albert Fair. Publishers, Industrial Publication Co., New York.

Estimating Frame and Brick Houses, Factories and Outbuildings, 250 pages, by Fred T. Hodgson. Publishers, David Williams Company, New York.

Sanitation and Sanitary Engineering, 175 pages, by Wm. Paul Gerhard.

Structural Details or Elements of Design in Heavy Framing, 370 pages, by Henry S. Jacoby. Publishers, Jno. Wiley & Sons, New York.

Architectural Composition, 234 pages, by Jno. Beverley Robinson. Publishers, D. Van Nostrand Co., New York.

Guide to Sanitary Inspection, 230 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New York.

Building Construction and Superintendence, 960 pages, by F. E. Kidder, revised by Thos. Nolan. Publisher, W. T. Comstock, New York.

The Water Supply, Sewerage and Plumbing of Modern City Buildings, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New Pork.

Modern Baths and Bath Houses, First Edition, 310 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New York.

Resistance of Materials, 650 pages, by N. de Tedasco and A. Maurel.

Modern Homes, 240 pages, by T. Raffles Davidson. Publishers, Geo. Bell & Sons, London, Eng.

The above books, together with a number of others, may be seen at the office of the Contract Record, 220 King street west, Toronto. Further particulars of any book furnished on request.

Parsons Trench Excavator For Sale

Will excavate trench 28 to 78 inches in width up to 20 feet deep. Also has special frame and equipment for trench 22 inches in width up to 14 feet deep. In good condition and well supplied with extra parts.

J. H. McKnight Construction Company, Ltd.,
15-17 Toronto, Ont.

Business Buildings and Industial Plants

(Continued from page 169)

Robe & Clothing Co. Manager, W. Barrie. General contractor, McNeill Contracting Co., King street W., Berlin. 3-storey, 50 x 60, reinforced concrete foundation, fireproof construction, electric light, steam heating, slate roof.

Calgary, Alta.

Plans are in preparation for tent and mattress factory to cost $6,000, River Bank, for Dixon Manufacturing Co. General contractor, Rutty & Weard, 1st street west. 2-storey, 150 x 40, concrete pillars, frame construction, electric ltg., tar and gravel roofing, ordinary trim.

Hotel to cost $58,000 for McKinistsis Hotel Co. Architects, Laing & Major. General contractor, S. J. Davis, 2422 Cedar avenue. 3-storey, 94 x 121, concrete foundation, brick, steam heating, electric lighting, tar and gravel roofing.

Chatham, Ont.

Plans are being prepared for express office to cost $7,000 for C.P.R. 1-storey, 40 x 50, stone foundation, brick construction, electric lighting, scales, trucks and general appointments, office equipment, etc., wanted. General contractor, John Hayman, London.

Fonthill, Ont.

Canning factory for Dominion Canners Ltd., Hamilton. General manager, Mr. Nairn. Architect is owner. 2-sty., factory, 150 x 40, warehouse, 125 x 40, preserving room 85 x 22. General contractor, E. A. Ponsford, St. David's, Ont. Brick, stone foundation, steam boilers, carrier, refrigerators, and all modern equipment.

Forest, Ont.

Canning factory to cost $25,000, for Dominion Canners Ltd., Hamilton. General manager, J. J. Nairn. General contractor, J. Davis, Aylmer, Ont. 2-sty. and basement, 150 x 40, and 125 x 40, brick. Complete canning machinery and equipment.

Hamilton, Ont.

Warehouse to cost $20,000, beside G.T.R. tracks on Ferguson avenue, for Hamilton Warehouse Forwarding Co. Manager, J. J. Sinnott. Architect, Stewart & Witton, 2 Hughson street. Contractor, Geo. E. Mills, 614 King street E., bulk contract. 3-storey and basement, 25 x 120, concrete construction.

Highgate, Ont.

Canning factory to cost $50,000 for British Canadian Canners, Ltd., Lister Block, Hamilton. Manager, J. Wall. Architect, Munroe & Mead, Chancery Chambers, Hamilton. Gen. contractor, A. E. Ponsford & Co., St. Thomas, Ont. Factory, warehouse, etc.

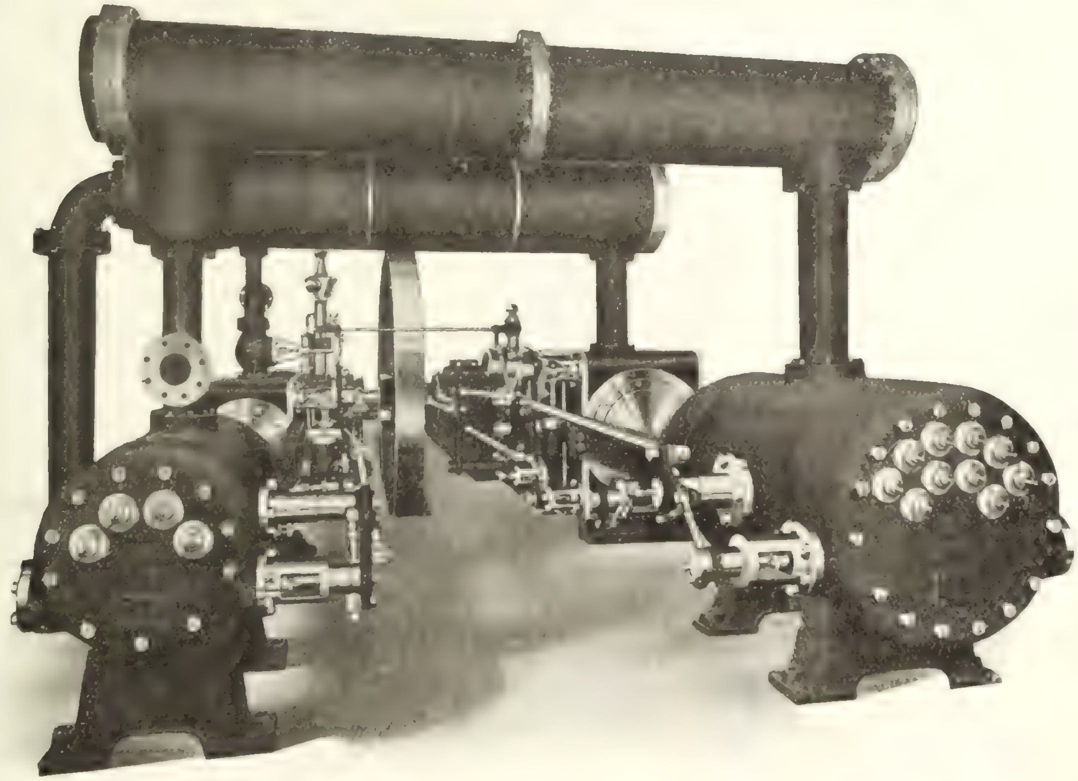
Lindsay, Ont.

G. W. Beal, Jeweler will erect an up-to-date building, brick front, electric ltg.

(Continued on page 174)

AIR COMPRESSORS

Quality - Prompt Delivery - Right Prices



Air Compressor built for National Transcontinental Railway, Winnipeg, Man.

Boilers, Engines, Penstocks, Water Towers, Steel Tanks
Heavy Plate Work, Condensers, Air Compressors,
Pumping Machinery

Let our representative tell you about "INGLIS" PRODUCTS.

The JOHN INGLIS COMPANY Limited

Engineers and Boiler Makers

14 Strachan Avenue - - TORONTO, Canada

steam heating. Contractor, John Thoburn, Lindsay.

Medicine Hat, Alta.

Warehouse, flour mill and elevator to cost $500,000, for The Ogilvie Flour Mills Co., Ltd., Montreal. Manager and Director, F. W. Thompson, Montreal. General contractor, A. A. Black. The above company are now waiting for special privileges to be granted by the council.

Montreal, Que.

Branch bank to cost $9,700, cor. Masson & 5th avenue, Rosemount road, for Bank of British North America, Montreal. Architect, Cox & Amos, 112 Mansfield street. General contractor, T. Lessard & Sons, Ltd., 191 Craig street, E., Montreal. 2-storey, 24 x 60, brick on rock foundation, hot water heating, electric light, tar and gravel roofing, plastic and pressed brick.

Addition to store and factory to cost $3,000, 1282 St. Laurence Blvd., for Carl Rosenberg, 60 Sherbrooke street west. General contractor, H. Wilensky, 93 Suzanne. 2-storey, 60 x 30, concrete coundation, brick encased construction, electric light, gravel roofing. Extension at back 60 x 25.

Alterations to bank at Market and Harbor streets, for Molsons Bank, St. James street, Montreal. General contractor, R. E. Edwards & Son, 200 Versailles street. Plumbing and heating, J. A. Gordon, 301 St. Antoine street. Interior alterations will be made.

Alterations to hotel to cost $11,000 on University avenue for Oxford Hotel Co. Architect, D. J. Crighton, Jacobs Bldg. General contractor, James Morrison, 207 Guy street. Painting and glazing, C. Sonne Jr., 73 Aylmer street. 3-storey, 42 x 96, concrete foundation, Indiana lime, stone and brick front, tar and gravel roofing, electric lighting. To extend building forward to street line, one storey, and make interior alterations.

Store and residence to cost $5,000, St. Catherine street East, for Victor Boileau, 85 Parthenais street. General contractor, O. Germain, 97 St. Catherine street. 3-storey, 23 x 77, concrete foundation, brick construction, gas and electric lighting, gravel roofing, furnace required.

Alterations to stores, 237 St. Catherine street, for F. W. Gross, 407 St. Catherine street. Architect, House of Browne, 207 St. James street. Gen. contractor, Simpson & Peel, 10 Benoit street. Painting, H. Daniels, 139 Fulford street. New store front, remodelled interior, barber shop.

Office building to cost $300,000, Notre Dame and McGill Sts., for McGill Street Syndicate, 135 Board of Trade Building. Architect, R. E. Rostrom, 132 Board of Trade Building. General contractor, C. E. Deakin, 11 St. Sacrament street. Engineer, Purdy & Henderson, 132 Board of Trade Building. Terra cotta work awarded to Terra Cotta Co., New York. 10-storey, 65 ft. 9 in. x 111 ft. 7 in., concrete foundation, stone and reinforced concrete construction, steam heating, electric and gas lighting, cement and gravel roofing, terra cotta facing, overhead feed system for steam, marble tile and hardwood floors, fire escapes, vaults and refrigerators, polished granite arches, 3 elevators (passenger) one freight; ornamental iron stairs, marble tread, wired glass, copper cornices, fire hose and fire tower. Steel work, Dominion Bridge Co., Lachine. Electrical work, L. K. Comstock & Co., Toronto.

Work has started on extension to warehouse and refinery to cost $20,000, 31 Mill street, for Dominion Linseed Oil Co., 31 Mill street. General contractor is proprietor. Extending 2nd and 3rd storeys, 55 x 147, stone masonry foundation, brick construction, felt and gravel roofing, gas and electric light.

Work has started on addition and alterations at 906 Notre Dame street, to Molson's Brewery Ltd, 906 Notre Dame street East. Architect, E. F. Hettinger, 906 Notre Dame street Sast. General contractor, J. H. Hutchison, 64 St. Ambroise street. Additional storey to present structure to be of stone and brick with steel and concrete floor and roof.

Storage building to cost $14,000, Dupre Lane, for National Breweries Ltd., 36 Chaboillez street. Architect, Cox & Amos, 112 Mansfield street. General contractor, Church, Ross & Co., 40 Hospital street. 2-storey, 60 x 95, concrete foundation, pressed brick construction, electric lighting, steam heating tar and gravel roofing.

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Consulting Engineer
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Water Powers, Street Railways & Cement Plants
Reports for Financing, Plans, Specifications
Inspection, Supervision and Management.
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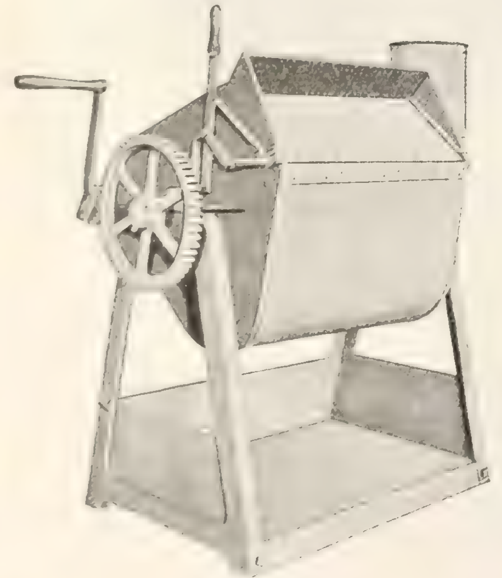
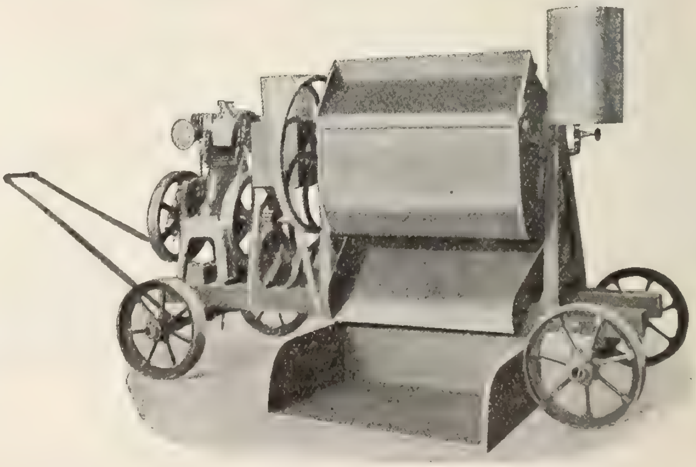


The Contractor or Builder who has a number of small jobs to do, not warranting a large and expensive concrete mixer, will profit by investigating our line of hand and inexpensive power mixers.



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**for Boiler Feed,
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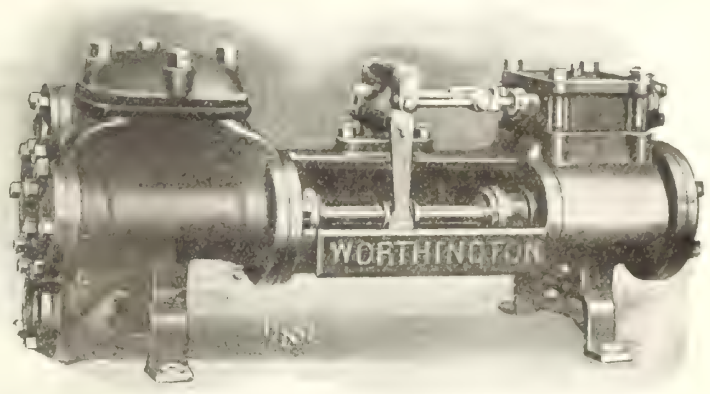

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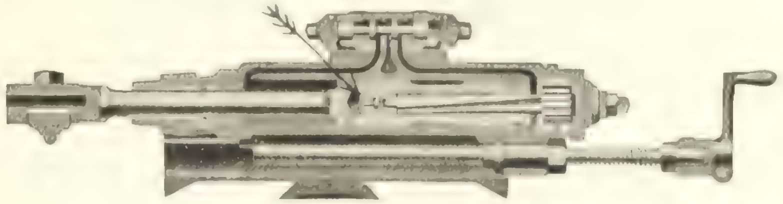
Don't Get in a Rut. Don't Form Habits in Business.

Don't allow traditions, and a stock of spare parts of obselete drills to keep you from using progressive methods and up to the minute tools.

The McKiernan-Terry "Wizard" rock Drill is the last word in a piston rock drilling machine.

It has an air cushioning device on the end of the rifle bar.



It was found by exhaustive tests that a drill equipped with this device would use 25% less compressed air, and strike about 50% more blows per minute.

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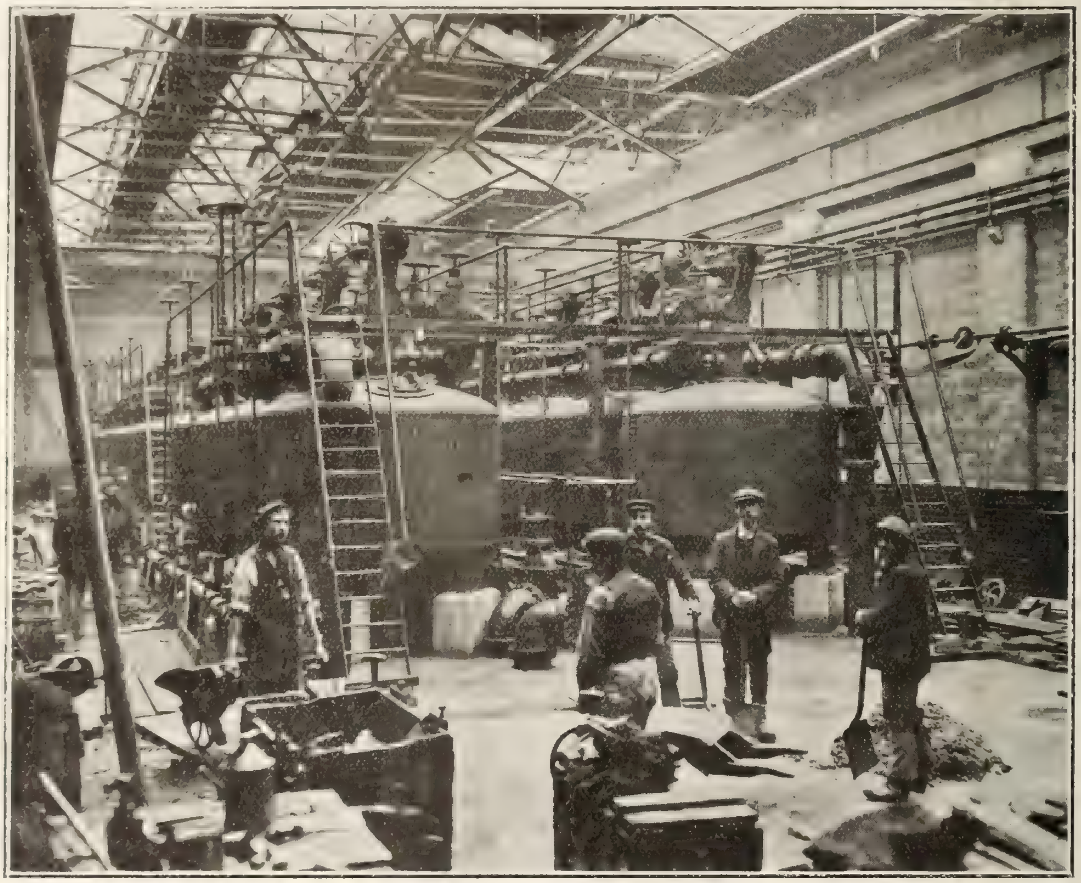

Pressure Filtration system for Stockport, England, one of the many plants installed by the makers.

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¶ Pressure filtration with mechanical washing is recognized in Europe as the solution of the problem of water purification and softening.

¶ The Bell Patent systems are the result of over fifty years' experience in Britain, and are in universal use.

¶ The cut opposite shows how purification is effected in a densely populated district, where no risks can be taken with the public health.

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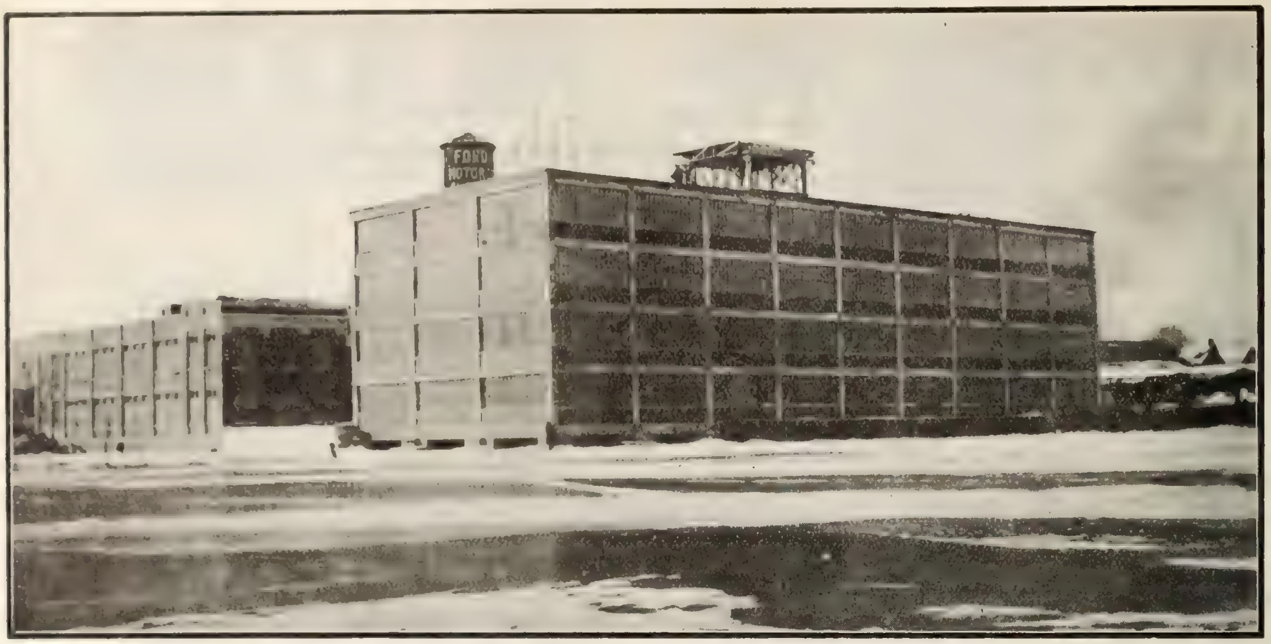

Factory built recently for Ford Motor Co., Walkerville, Ont:

This large Reinforced Concrete Building (200 ft. x 75 ft.) is built out over the Detroit River. We have the equipment and the experience to carry out successfully large and difficult contracts especially Building and General Concrete Constructive Work.

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The Largest Plant in Canada, manufacturing Planing Mill Products
Located in the Heart of the Canadian Lumbering District

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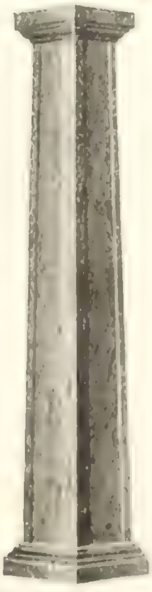
Mission Column
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New Ideas
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Big Stock for Prompt Shipment of Stock Design Doors, Mouldings, Turnings, Columns, etc.

WE GUARANTEE
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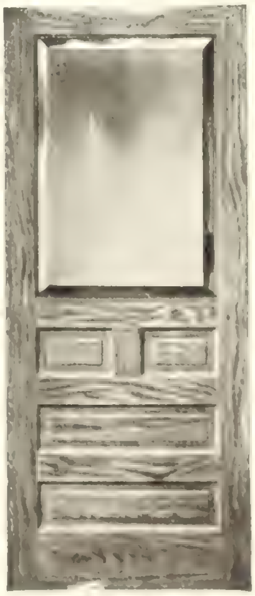
A1 Pine Door
For Hardwood Finish

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Georgian Bay Shook Mills, Limited
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Consulting Engineers and Contractors for

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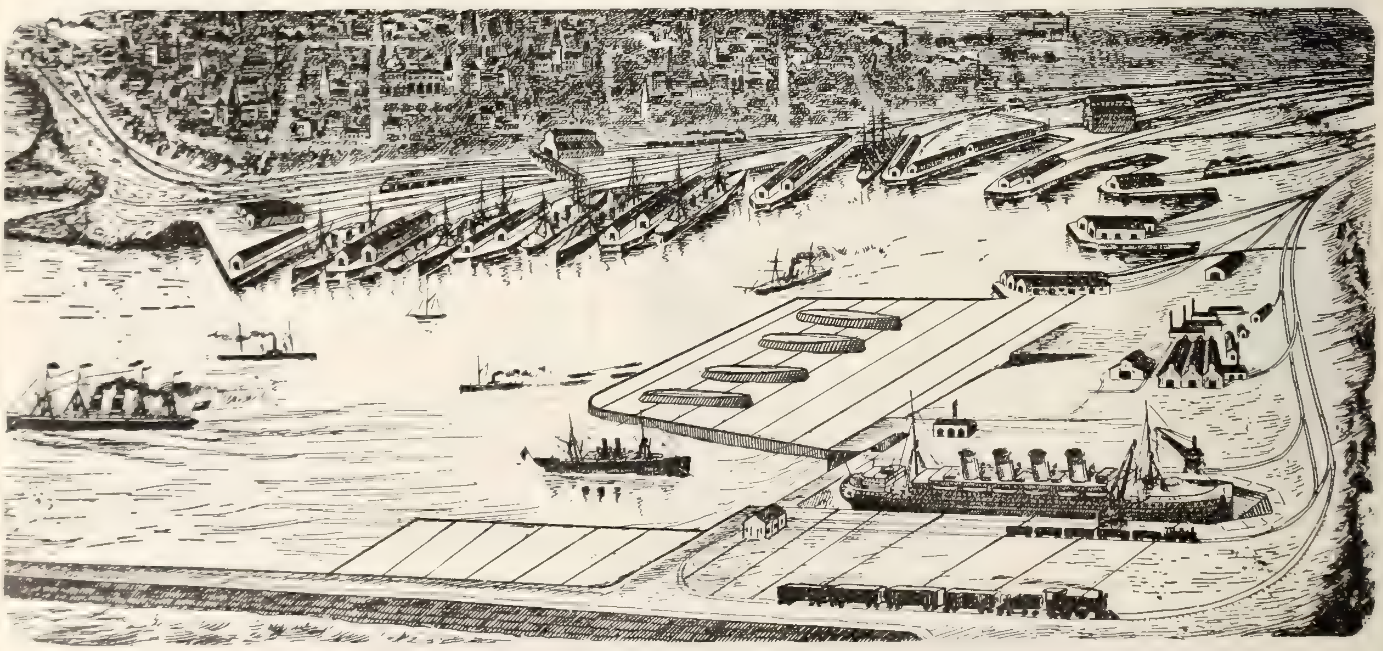
Canadian Offices: **VANCOUVER** **MONTREAL** **WINNIPEG** **ST. JOHN**

Construction Work undertaken and offices in Australia—Persia—Africa South America—England and Canada.

We have completed some of the most important railway—dock—and sewer enterprises in the world.

We are about to construct the harbor work at St. John, N. B., the largest contract of its kind ever given in Canada.

The Head Office of the Company is in Vancouver, B. C., which is also the Head Office of the Norton Griffths Steel Construction Company, who are erecting some of the largest steel and ferro-concrete buildings in that city and other works on the west coast. The sketch below gives a general idea of the scope of the proposed works at St. John, N. B.



General View of Proposed Harbor Works and Ship Repairing Yard, Courtenay Bay, St. John, N. B.

The Geo. B. Meadows, Toronto

Wire, Iron and Brass Works Company, Limited

Manufacturers of

Wire Cloth, Wrought Iron, Light Structural Iron Work and General Wire Work

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The following are some of our special lines.

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Ornamental Iron Fencing and Railing of every description, Iron Stairs, Shutters and Doors, Fire Escapes, Lamp Standards, Steel Shelving, Light Structural Work, etc.

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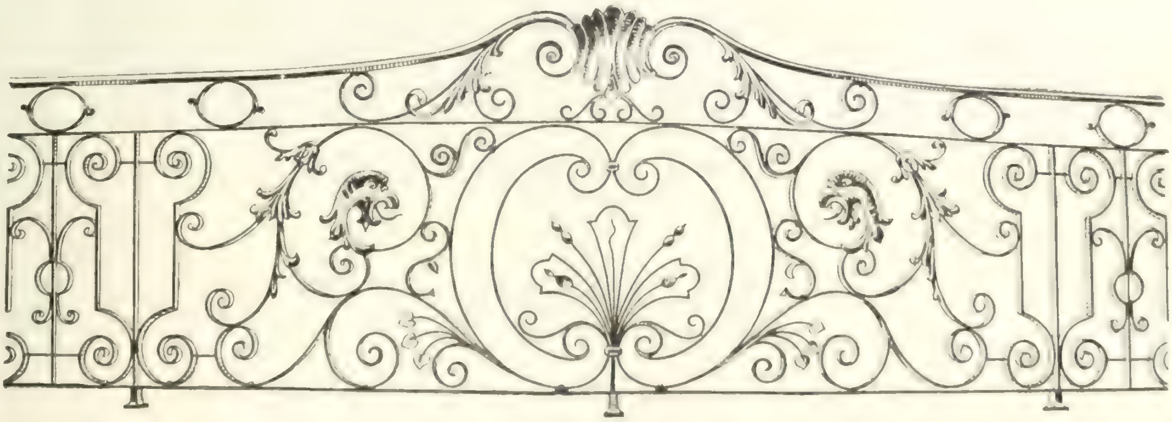
Wire Cloth for Foundry, Mining and Milling purposes. A full line of Foundry Riddles Sieves, Coal Screens, etc., etc.



These lines we are manufacturing all day and every day—lines we have been manufacturing for 60 years past and in which, we embody the very best quality and highest skill obtainable. Also we manufacture in a quantity that enables us to offer our products at reasonable prices—prices that will compare favorably with any others. We are competitors and we can deliver the goods.

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Crushed Stone

For Concrete and Macadam

THE TOUGHEST STONE FOR MACADAM IN ONTARIO

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Capacity increased from 400 tons to 1,000 tons per day.

Why use a cheap stone that would last one or two years when an indestructible stone would cost but a few cents per ton more?

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Stone delivered on G.T. R., M. C. R., C. P. R. and T. H. & B. Railways

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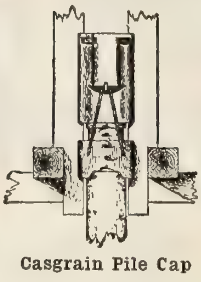
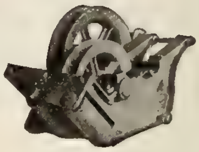


Casgrain Pile Cap



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Art Leaded Glass

Memorial window designed and executed by Wm. Briscall Co.

Art Windows for churches, residences, public buildings, &c., &c. Special designs and estimates submitted. Every attention given to decorative styles where required.

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Dudley S. Van Antwerp, Architect, Montclair, N. J.

Cabot's Waterproof Cement Stains

**Artistic Coloring and Thorough
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They give the same soft, artistic coloring effects as the celebrated Cabot's Shingle stains and at the same time make all exterior cement surfaces ***completely*** and ***permanently*** rainproof. They sink into the pores and form no coating over the surface, and therefore do not cover and spoil the natural texture of the cement and cannot crack or peel off. Low cost, easy to apply, and the only artistic colorings for cement.

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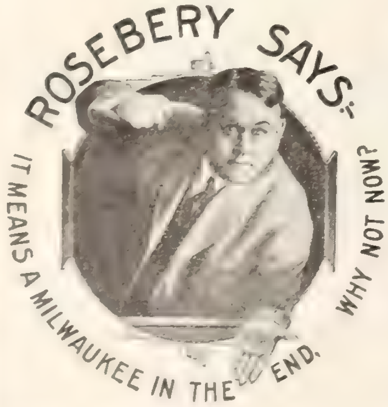
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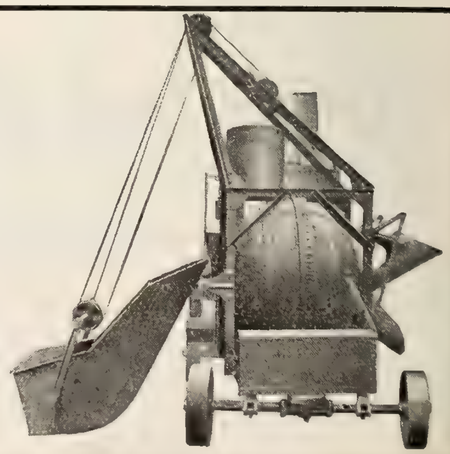

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Stadacona Hydraulic Co'y., St. Fereol, Prov. Que.

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Specialists in the Construction of Complete Hydraulic Developments.

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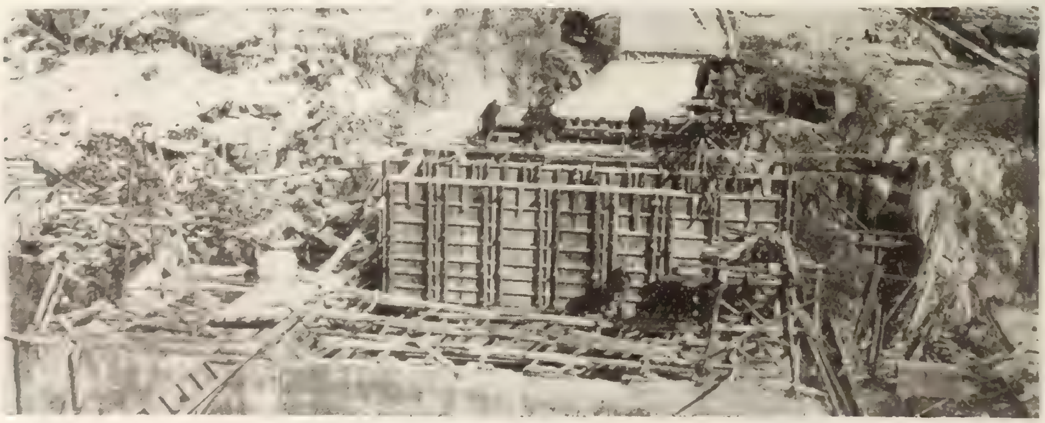

Coffer Dam, Magpie River, Ont., Lake Superior Power Co.

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Work undertaken in all parts of Canada.
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Completed Dam and Power House, St. Annes River,
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New Montreal Harbor Sheds. Seven of these Sheds Rest on 3,800 Raymond Concrete Piles

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Raymond Concrete Piles driven in any part of Canada.

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BUILT TO LAST

LAKEWOOD LINE

LAKEWOOD LINE
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A LAKEWOOD MIXER was mounted on a flat car, run to place (note COMPACTNESS and PORTABILITY) and the Lakewood special side loading attachment and controllable rolled-steel, sectional discharge-chute handled and delivered materials and concrete. The possibility of extending the side loader on the Lakewood machine to a point several feet below the level of the mixer is an advantage every contractor will readily appreciate. Machines are in use where the loading bucket is charged eighteen feet below the level of the mixer, and even that distance may be exceeded. LAKEWOOD MIXERS are of all heavy steel construction—built to last through heaviest service and built to eliminate wear and tear in every detail of operation. The SLOWLY REVOLVING drum does not wrack the mechanism to pieces, yet is designed to mix and deliver the maximum of concrete quickly. Charging and discharge controlled by two levers on the same side, operated by one man. A point that means a lot is the fact that a special construction prevents the drum shifting laterally, whether the mixer sets level or not.

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Cleveland, Ohio, U. S. A.

A. D. MASSON, QUEBEC, 30 St. Nicholas Street

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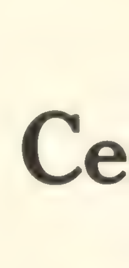

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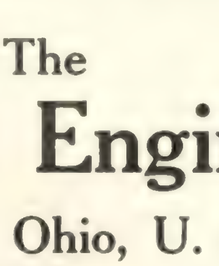

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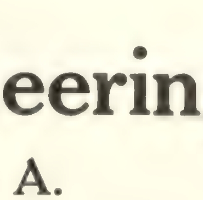

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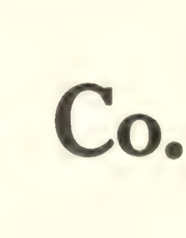

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Single drum, double-acting, complete with 6 H.P. water hopper cooled engine or motor.

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Single or double cage. Elevators 4 feet by 6 feet.

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Portable Power-driven Bilge Pump. Does the work of four men at 20 cents a day.

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Of No. 10 gauge iron, 8 feet long by 3 feet high. Continuous feed. In two sizes.

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Portable Saw Rigs
Made in four sizes, to meet the requirements of every line of the contracting trade.

Column Clamps
Made of machine steel with malleable iron wedges. Clamp adjustable to fit any size form from 12 to 26 inches.

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Made of steel in sections, easily handled. A great money saver.

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Portable Fire Proof Steel Buildings

Any Size for Any Purpose

The general impression that a portable steel building is a loosely constructed shack made to serve merely as a temporary or makeshift shelter, is being contradicted every day in the most convincing way. Every building that leaves our factory daily is a complete contradicton of that impression. RUBY PORTABLE STEEL BUILDINGS embody these essential features in their construction. They are :

PORTABLE Easily shipped—easily put together. Each section made to gauge which ensures absolute uniformity and a perfect fit when assembled.

FIREPROOF Undestructable steel frame. Caving-in or twisting with heat an impossibilty. Walls and roof made of best heavy galvanized steel sheets. Every part of the construction non-combustible and non-corrosive. Easily heated in the most severe climate.

RUBY SECTIONAL STEEL BUILDINGS made for almost every conceivable purpose Private Garages, Summer Cottages, Boat and Bath Houses, Hunting Lodges, Contractor's Buildings, Farm Buildings, Tool Houses, Work Shops, Engine Houses, Hand Car Houses and Real Estate Offices.

Agents wanted in every part of Canada. We have a most attractive proposition. Write for full particulars.

Canadian Agency

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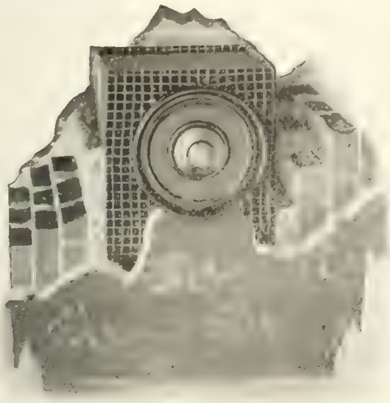
Builders' Hardware Specialties

Sole Agents for the George Wragge Metal Sash

10 Adelaide Street West -:- TORONTO, ONT.



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A Safety Deposit Box at home, solidly built in the wall. It gives perfect protection against dishonest servants, house thieves and fire and proves of great convenience for the storage of valuables, obviating the necessity of journeys to the bank or public safe deposit.

Saves anxiety, trouble and the rental of a box in a public vault. Installed in an apartment house or hotel or private dwelling it will prove a good paying investment—a veritable rent getter. No modern building is complete without them.

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We have a very large selection of high grade Cut Glass Knobs, Cut Glass Lever Handles and Art Hardware of the Russell Irwin and other high grade makers. We also have a very fine selection of high grade English and French Hardware.

We are the sole Ontario agents for

"Wragge Steel Sash"

The "Wragge" Casements are fireproof from inside as well as outside, thereby giving a double protection and keeping a fire within the building where it originates. They are adaptable to all classes of buildings, residential as well as public, and are weatherproof under all conditions.

Messrs. George Wragge, Limited, also manufacture the best type and quality of Factory Sash with openings for ventilation and safe cleaning. They may be glazed on either inside or outside as desired.

The cost of metal casements and factory windows is but little more than wood when it is considered that all hardware and fittings are included in our prices not to speak of the more important matters of fire protection and durability.

We shall be pleased to prepare and submit estimates for any and all kinds of construction where fireproof windows are desired.

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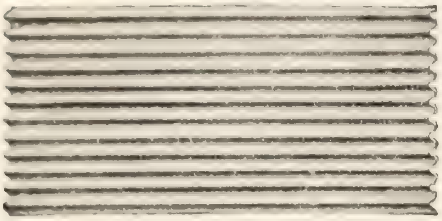

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Trident Breakable-Bottom Meter

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Branch Bank of Toronto,
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Dominion Bank Branch,
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Dominion Bank Branch,
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Carrere & Hastings and E. G. Bird,
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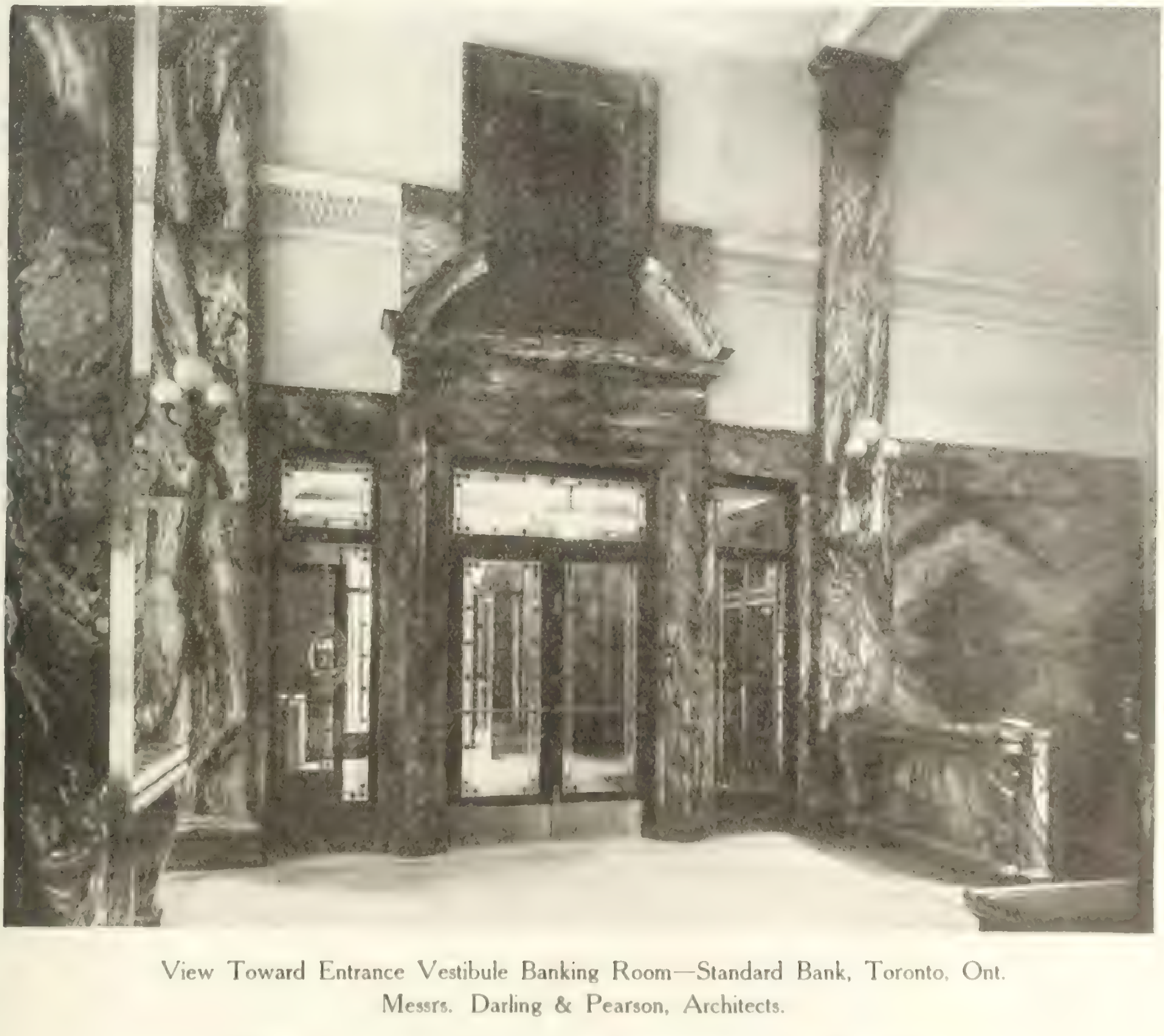

View Toward Entrance Vestibule Banking Room—Standard Bank, Toronto, Ont.
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Dominion Bank, Vancouver, B.C. " "
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Bank of Nova Scotia, Kingston, Jamaica, Darling & Pearson, Architects
Bank of Montreal, Yonge and Queen, Toronto, " "
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Parliament Buildings, Toronto, E. J. Lennox, Architect
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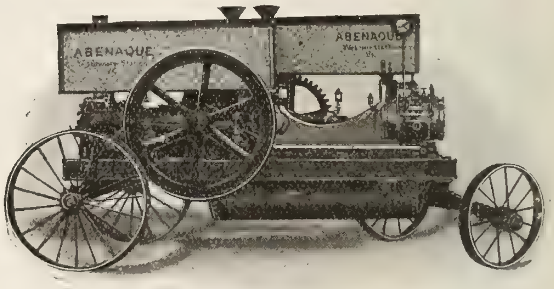

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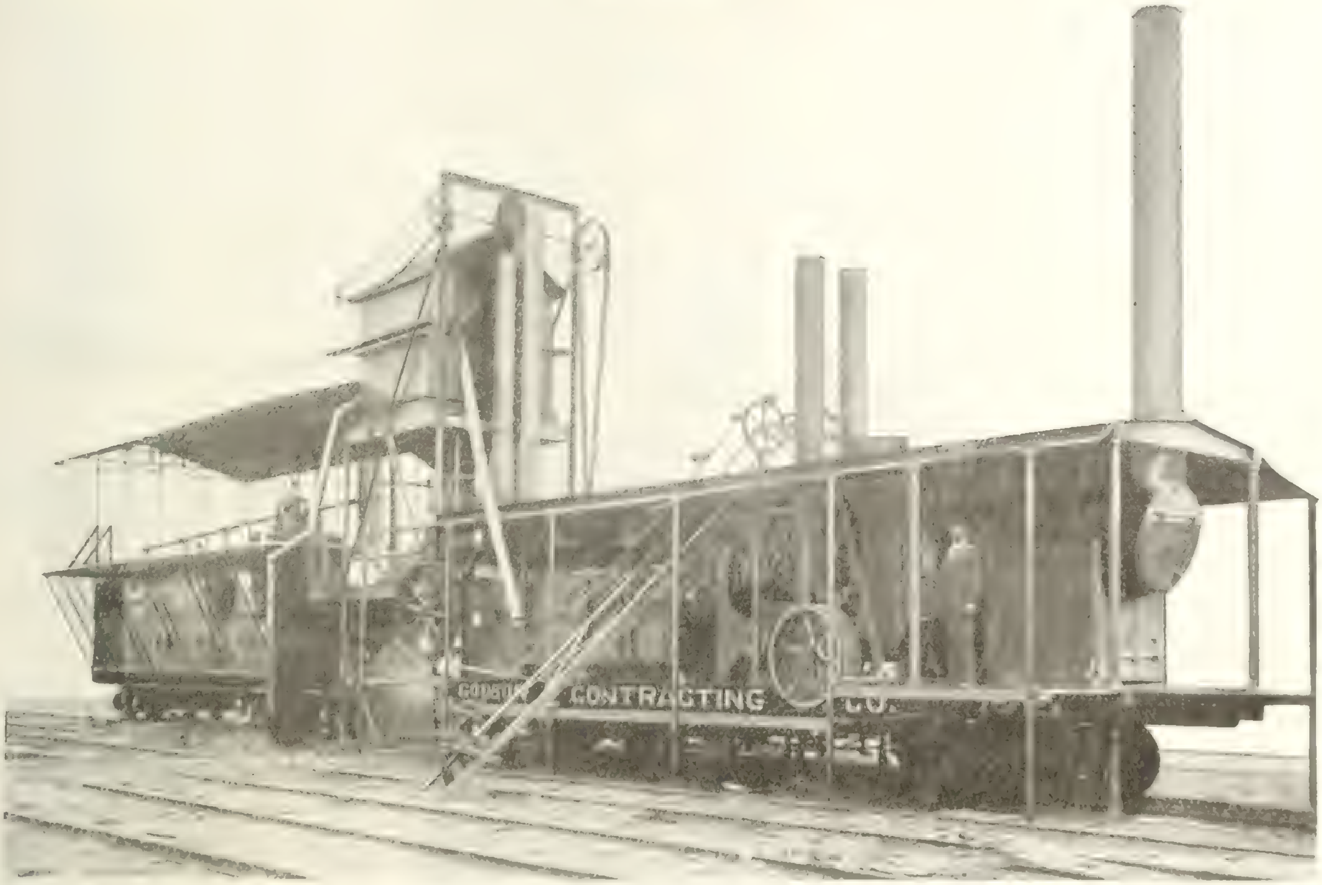

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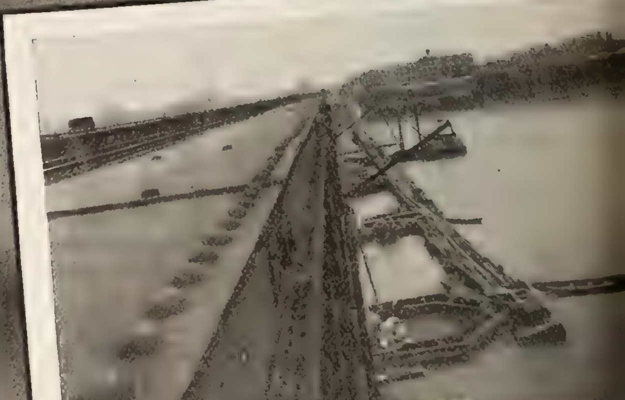
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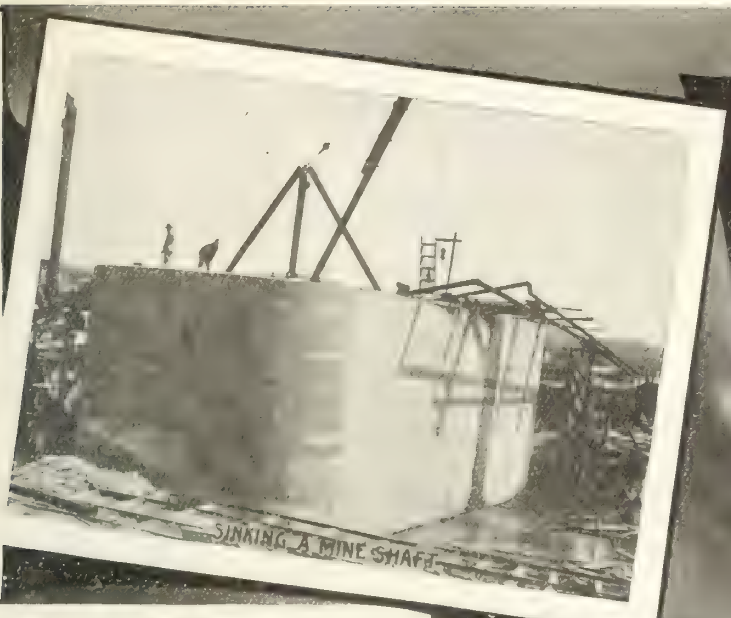

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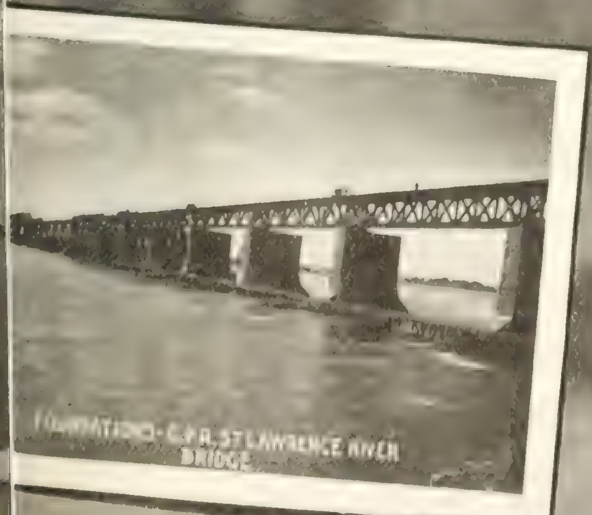

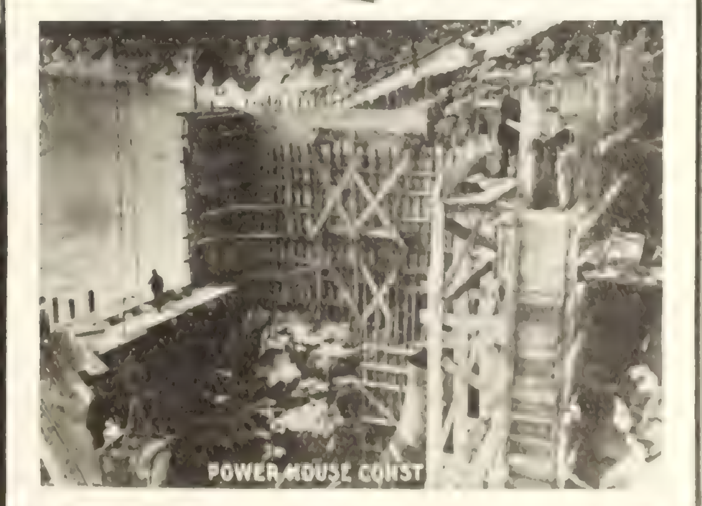

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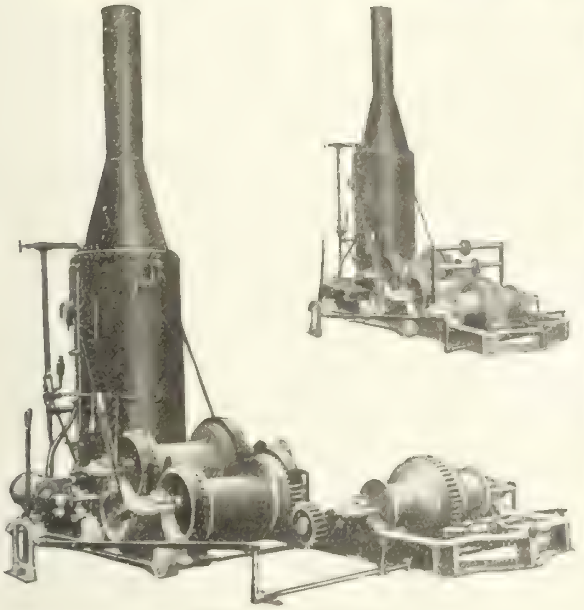
For use of Builders or Contractors



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with Swinger Set either at side or in front

We supply these hoists with one, two, three or more drums, and in 7 sizes, 10 H.P., 15 H.P., 20 H.P., 25 H.P., 32 H.P., 40 H.P. and 50 H.P.

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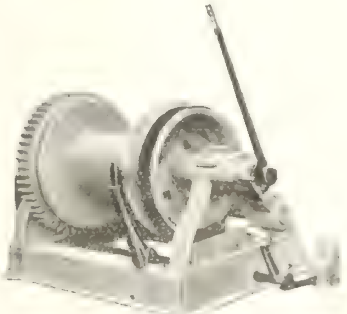

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We make these with either one, two three or more drums. We also make them for ELECTRIC DRIVE, direct connected to motor.

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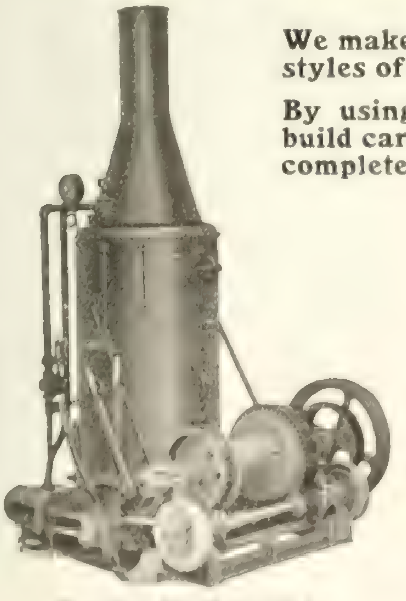
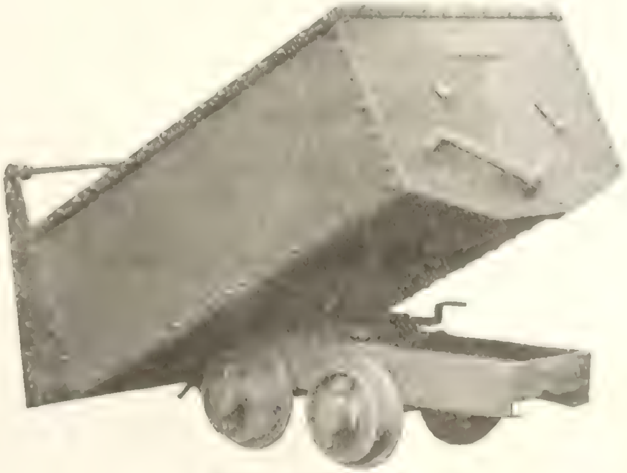
By using our Car Irons, Contractors can build cars cheaper than they can buy them complete.



Special Builder's Hoist

with large sheave for operating Platform Elevator. Made in the same 7 sizes as above.



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We make Steel Body Dump Cars [illegible]

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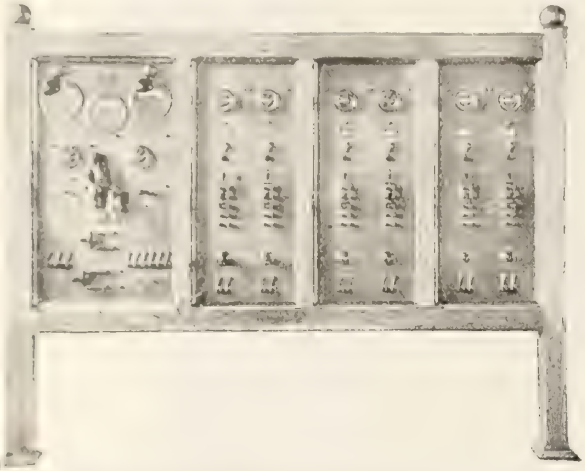
We are the largest and oldest manufacturers of Fire and Police Alarm Telegraph Apparatus in Canada, and 90 per cent. of the installations throughout the country are the product of our factory.


Front View of Fire Alarm Switchboard Recently Furnished to Corporation of Amherst, N.S.

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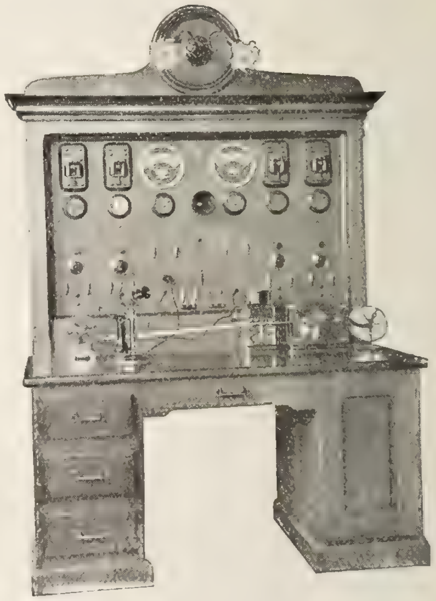
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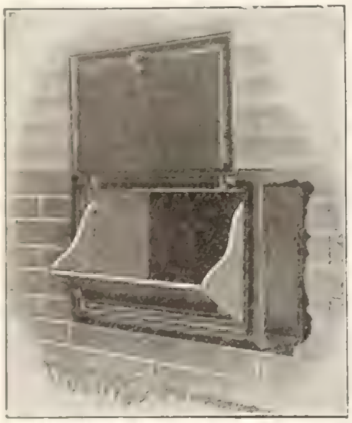
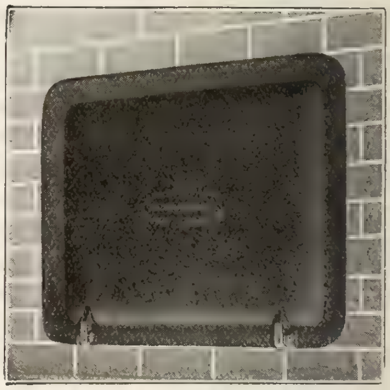


This illustration shows the chute open to receive fuel—clean, compact and convenient

The Service of a Cellar Chute

The installation of a cellar chute has passed the stage where people regard it as a luxury. Its utility and cleanliness have made it a necessity in the building of every good residence. Most modern buildings are built with a heating system that requires the storage of its fuel in the basement,



This illustration shows the chute closed—note the neat, clean and finished appearance

THE MAJESTIC COAL AND WOOD CHUTE

provides the most efficient opening to admit fuel to the cellar. It entirely does away with the old cellar window which invariably looking dirty and dilapidated.

With the Majestic Coal and Wood Chute all fuel is guided through the opening by an adjustable Hopper, thus avoiding any scattering of the fuel on the ground.

The construction is such that upon opening the door of the chute the Hopper swings out into position ready to receive the coal. When closed the door is flush with the wall and locks itself automatically from the outside. It can only be opened from the inside and is positively burglar-proof. Constructed throughout of heavy steel and cast iron. Will last a life-time.

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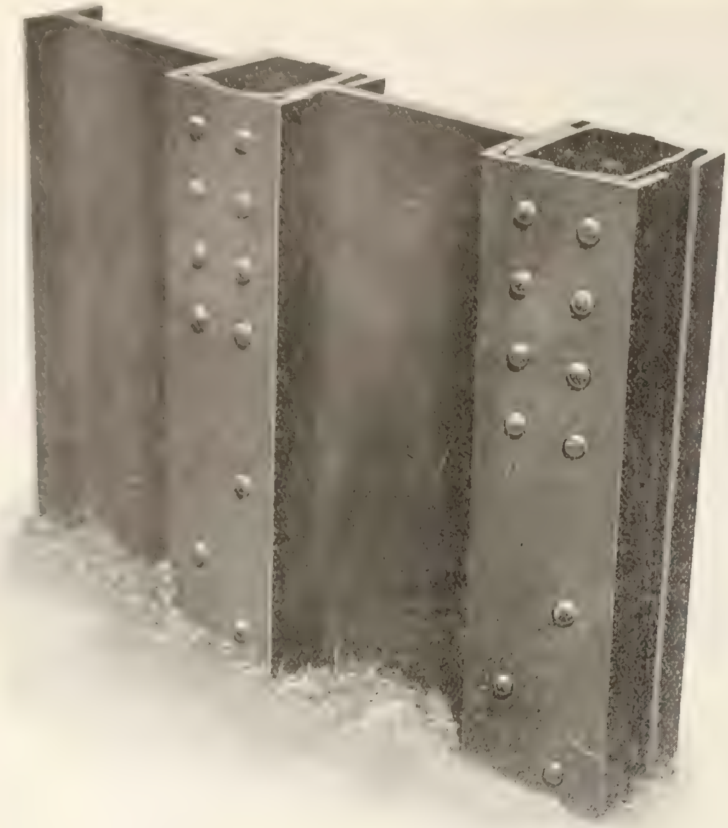

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For Bridges and Building Caissons, Cofferdams, Dams, Irrigation and Reclamation Work, Retaining Walls, Sewer and Trench Work, Mining Shafts, Foundations.

Especially adaptable for permanent and temporary deep and heavy work not successfully accomplished by other types of piling, such as Deep Water Cribs, Docks and Dry Docks, Breakwaters, Wharves, Sea Walls, Locks, Light Houses and Submarine Work. This piling can be made for all classes of work, can use all Standard Rolled Beams and Channels thus giving a piling that will fill the bill for any work above specified. It drives freely, keeps in alignment, water tight and great strength.

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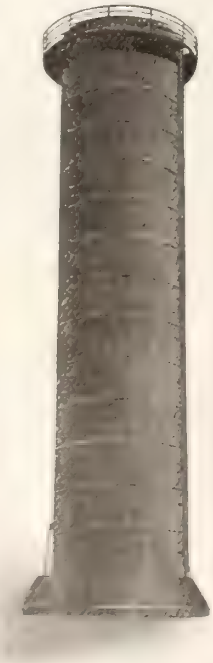
(Owen Sound) Engineer in Charge.

We manufacture Steel Bridges of all kinds, the above cut shows our work and this is what the engineer in charge has to say about it.

396 ft. Bridge over Sanguine River near Southampton



Send us your specifications for your Stand Pipes, Water Tanks for we make a specialty of this class of work. Have had many years experience and can furnish you with references if necessary as to the standard of our work.

We also manufacture all types of Boilers, Marine and Stationary. Get our prices before placing your orders for Boilers, Bridges, Stand Pipes, etc. It will pay you.

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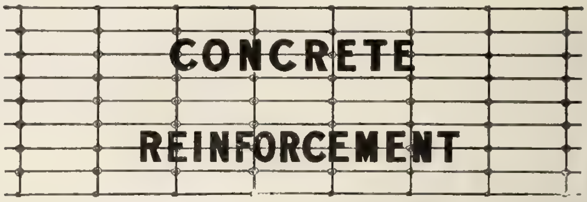
solves the problem of quick laying, contouring, proper tamping, perfect setting of concrete spans, and the easy preparation of column reinforcement.

Sheets are in flat units of any length. Bonding area is 27.7528 lineal inches per sq. inch of section, against 3.5343 and 4.0 ins. for round and square bar.



Tensile strength is **one and a half** that of steel bar, allowing equal strength with two-thirds the weight of reinforcing, and nearly **six** times the bonding area for increased safety, compared with bar steel.

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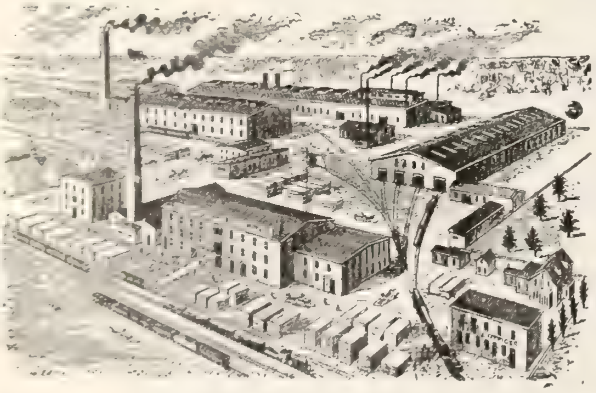

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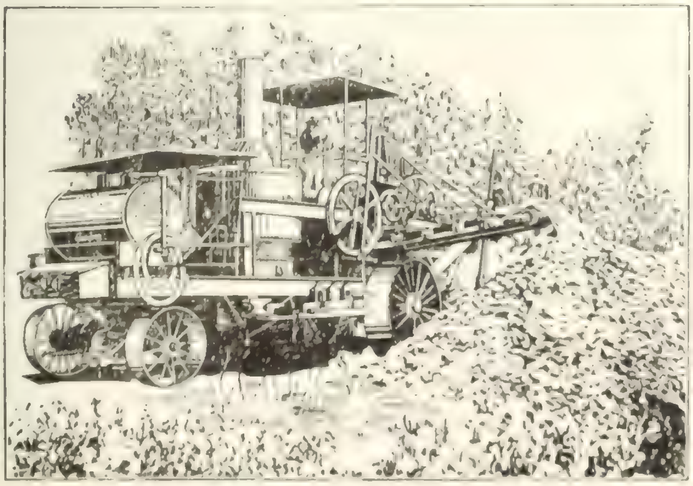

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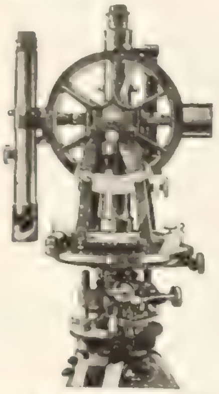

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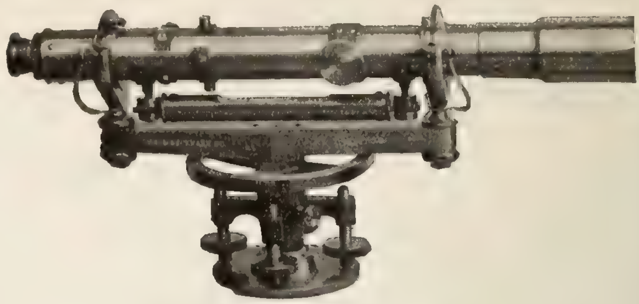

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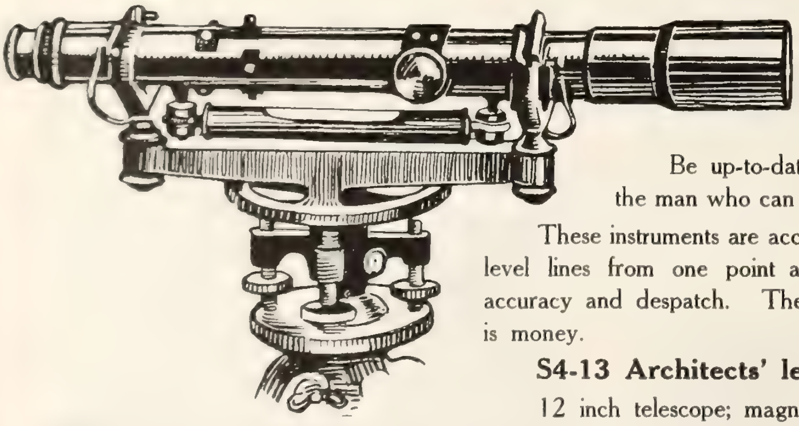

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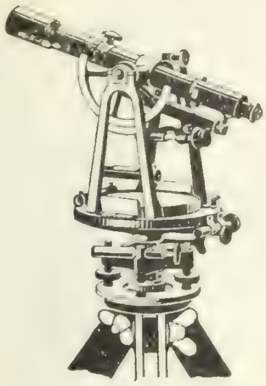

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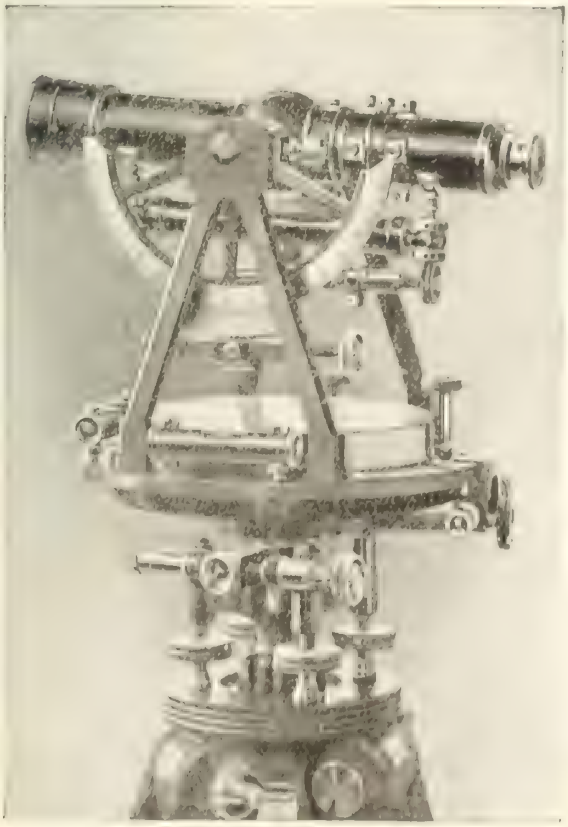

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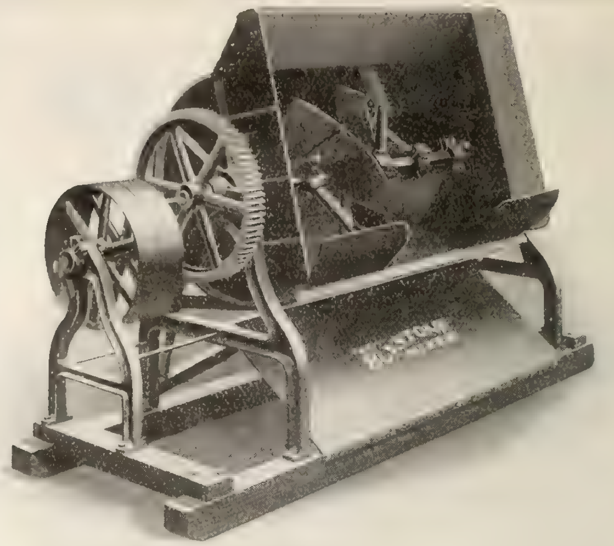

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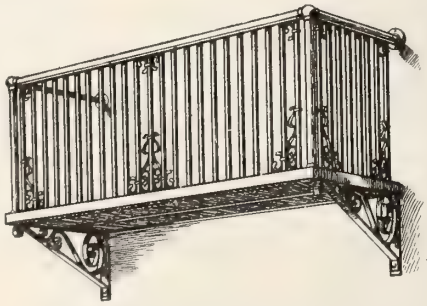

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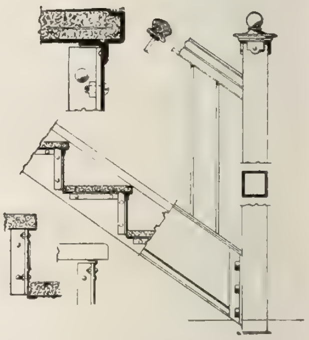

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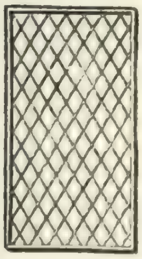

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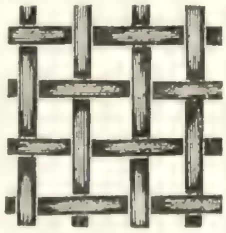

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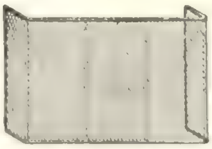

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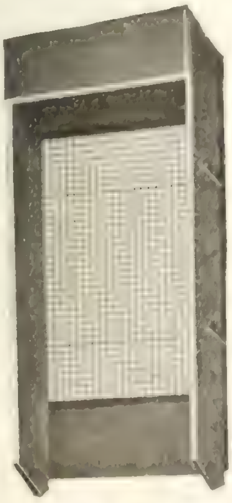

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Made in ten foot lengths absolutely true and straight.
This Bead is galvanized and will not rust.

The cut opposite illustrates how
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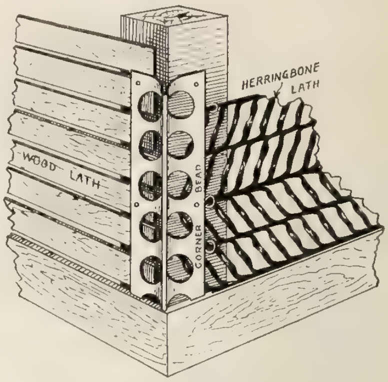
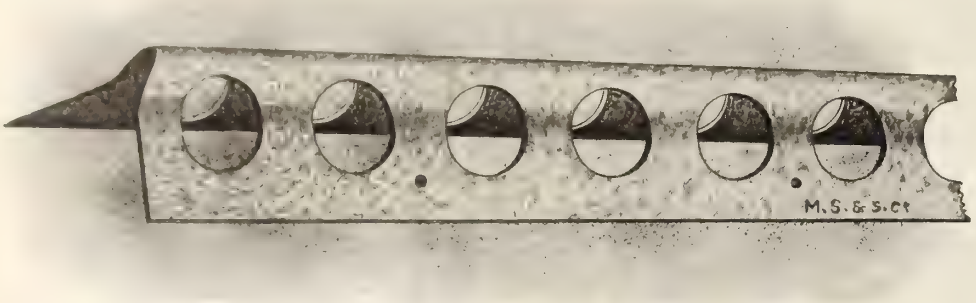
is applied to corner in connection with either wooden or metal lath. It is easily nailed in place and insures a perfect protected corner.





The above cut illustrates the construction and formation of
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Made in 10-ft. lengths, absolutely true and straight.
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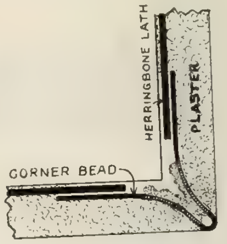
The cut below shows position of Bead in the plaster. Note how it reinforces and protects the plaster.



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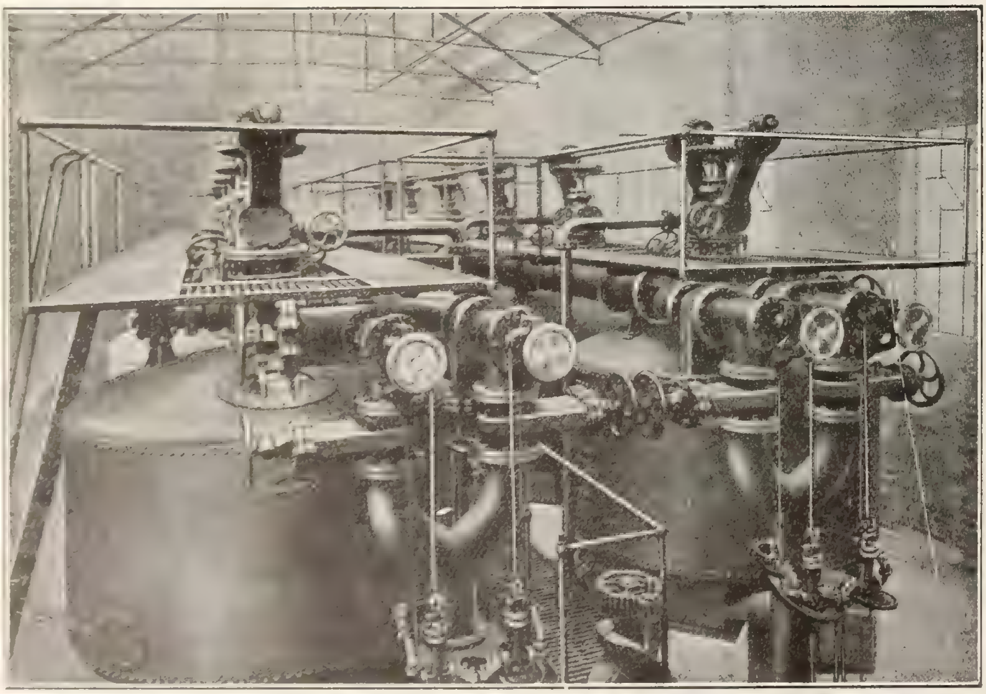

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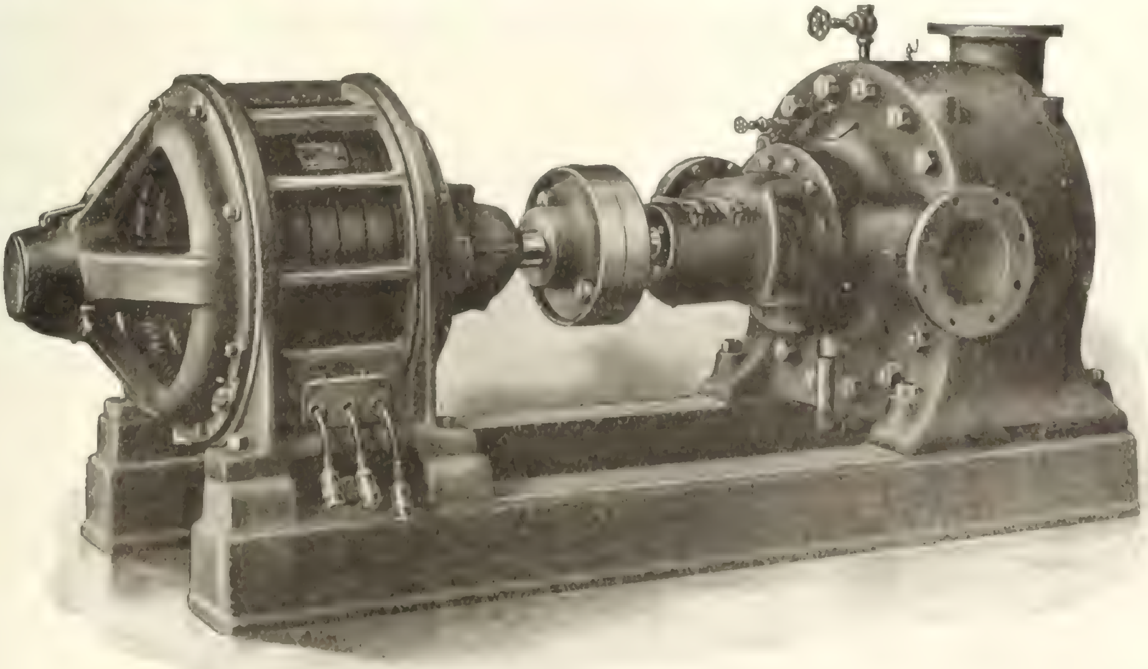

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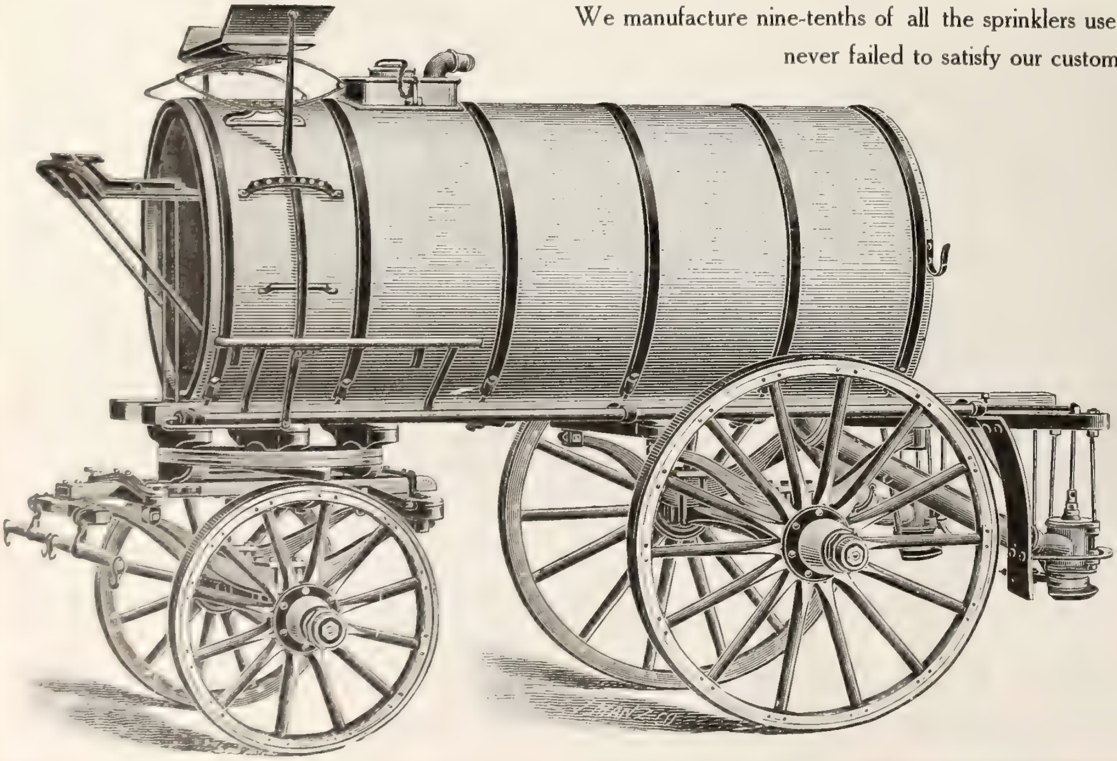

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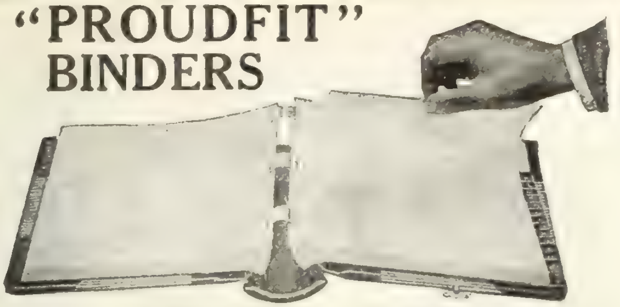

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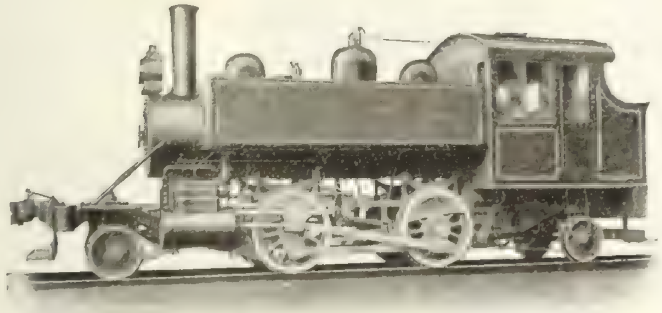

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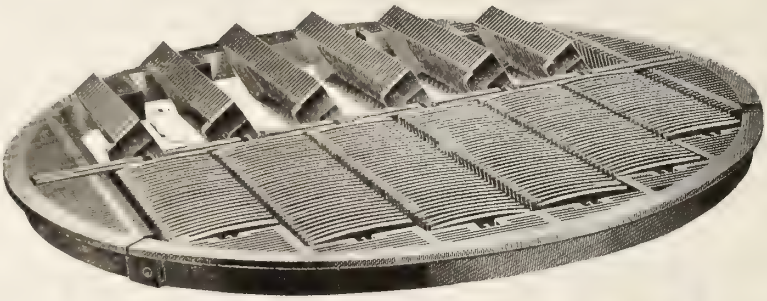
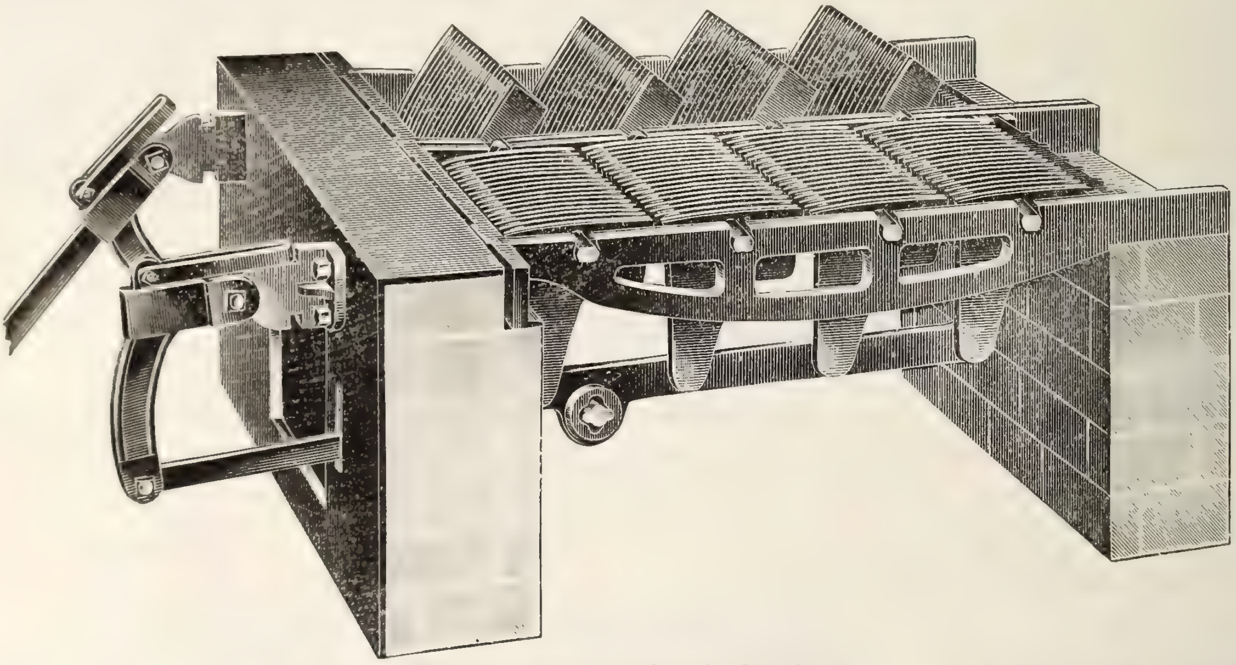


Circular Grate, designed for Adam Hett for W. M. Lowney's Chocolate Works, Montreal



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Grate Bar Specialists

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We install them in every type of furnace, brick-kilns, and gas-producers, where they are to-day giving better results with cheap coal, such as screenings, coke, breeze, etc., than was formerly obtained with the best coal on old style grates.

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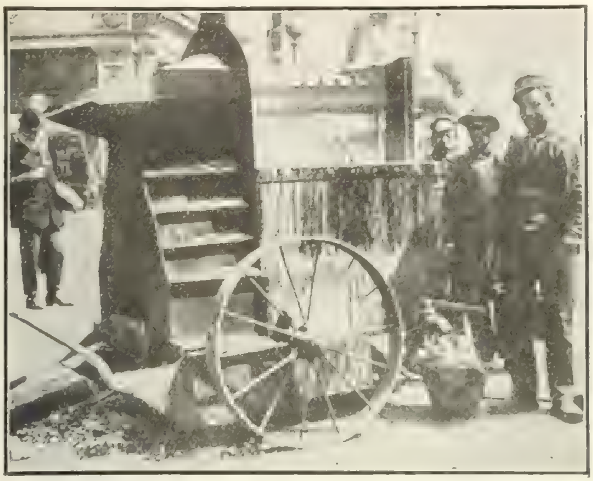

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We can make immediate delivery of any of the above materials from any one of our branch yards. Would be pleased to have your order.

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We can furnish designs and estimates for any type of Steel Bank Head or Head Frame, or for the complete Bank Head Equipment, and will contract to erect same at any point in Canada. We designed and constructed the steel Bank Head at the "Allan Shaft" Colliery of the Acadia Coal Company, Stellerton, N. S. This is the largest Coal-Mine Bank Head in Canada, and one of the largest in America.

Wm. P. McNeil & Co., Ltd.
NEW GLASGOW - - - Nova Scotia

Take the Best Care of Your Horses, it will Pay You

Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

The lines that are selling best are:

Johnson's Horse Liniment, No. 1 (Alcoholic)

1 gal. jugs (Imperial)	$1.50 gal.
1 lb. bottles	8.00 doz.
2 lb. bottles	15.00

Positively the best all round Horse Liniment made

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1 gal jugs (Imperial)	3.00 gal
1 lb. bottles	6.00 doz.
2 lb. bottles	11.00 doz.

Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal jugs (Imperial) 40 doses	5.00 gal
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2 lb. bottles 8 doses	15.00 doz

Johnson's Veterinary Healing Ointment (Gall Cure)

2 lb. tins	2.00 per tin
4 oz tins	3.50 doz

Johnson's Condition Powders (Concentrated)

1 lb packages	3.00 doz

A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men
Johnson's Mosquito Oil 1.75 doz., 18.00 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

A. H. Johnson, Wholesale Druggist, Collingwood, Ont.

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Hollow and Solid

Picks

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"Hardy" Rock Drills
Lighter in weight Economical on air

Hoisting
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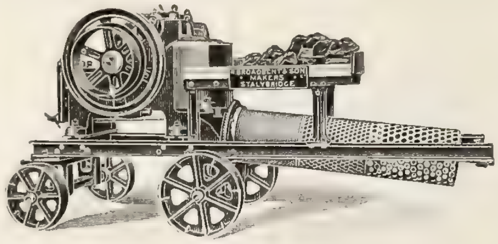
Complete Diving Outfits
Dresses, Mittens, etc.

Concrete Mixers

Batch and Continuous
Street Paving Machines



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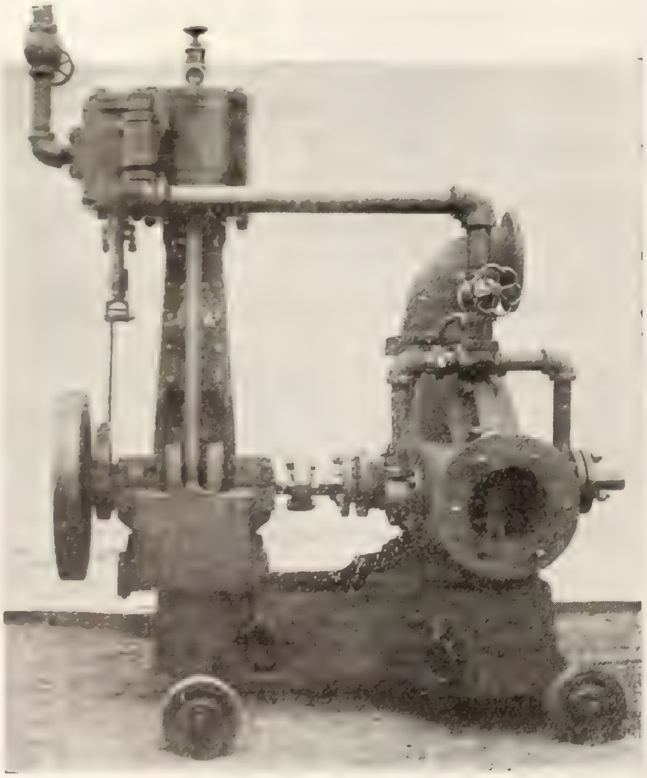
Portable and Stationary
Elevators and Screens

28 Bedford Row G. B. OLAND & CO'Y. Halifax, N. S.

Contractors' Centrifugal Pumping Engines



This cut represents our 6" 1800 gallon Contractors' Centrifugal Pumping Engine, a paying investment for any contractor whose needs require that water be handled quickly. Capacities 1,000 to 4,000 gallons per minute. Will pump water mixed with sand or gravel.

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We are constantly buying up good Second Hand Machinery. Write us when you want anything. We may have just what you require and at a price that will surprise you.

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HALIFAX, N.S.

Mechanical Engineers and Machinists

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"B A 23" Butterfly Valve Hammer Drill with Broad Tee Handle Weight 43 pounds

A Drill Runner without a Helper Reduces labor cost.

A Saving in Time means Lower labor costs.

A Saving in Plant Investment means Lower Interest and Depreciation Costs.

A Saving in Power means Lower Fuel Costs.

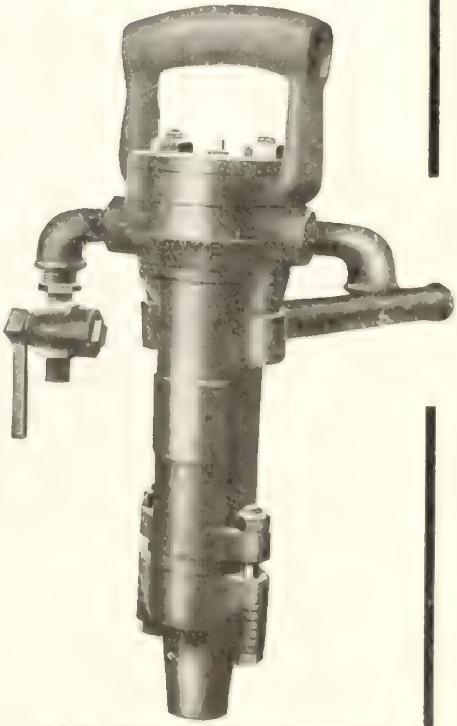
The Minimum of Breakages and Repairs means Low Upkeep Costs.

Increased Drilling Capacity per man means Larger Output at Lower Labor Costs.

All these factors combine to give a low cost per ton of rock removed or per foot of hole drilled, and they can all be effected by the use of

"BUTTERFLY" VALVE HAMMER DRILLS

LET US GO INTO YOUR DRILLING PROBLEMS WITH YOU



B A 36 Butterfly Valve Hammer Drill with Swivel Handle and separate Rotating Handle

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COMMERCIAL UNION BUILDING
MONTREAL - CANADA

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for any Contract that may come along, being sure that all your Equipment is RELIABLE.

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Dump Cars, Axles Wheels, Etc.

and our products have given general satisfaction.

Write for references.
Enquiries and correspondence respectfully solicited.

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Manufacturers of Contractors' Needs of Every Kind.
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We supply and install apparatus for sterilizing water supplies by the application of calcium hypochlorite.

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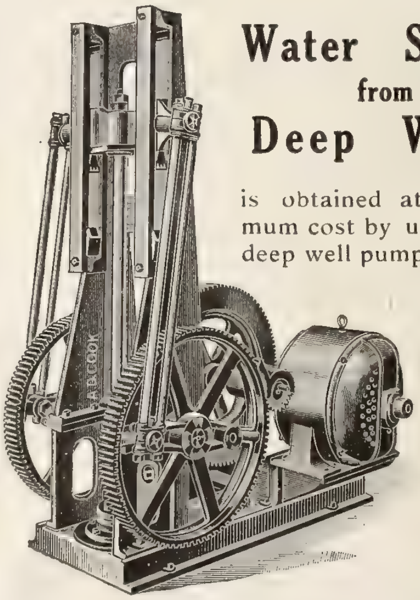
We have no affiliations or working acquirements with any of our competitors.



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is obtained at a minimum cost by use of our deep well pumps.

Write for Bulletin 26 explaining the use of Cook's Patent Brass Tube Well Strainer

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Lawrenceburg, Indiana, U. S. A.

Manufacturer of a Complete line of **DEEP WELL SUPPLIES** including Steam, Belt and Motor Driven **DEEP WELL PUMPS**, Wind-mill and Hand Pumps, Working Barrels and Valves, Pump Rods and Pump Rod Joints, Drill Rods and Drill Rod Joints, Drilling and Well Tools.

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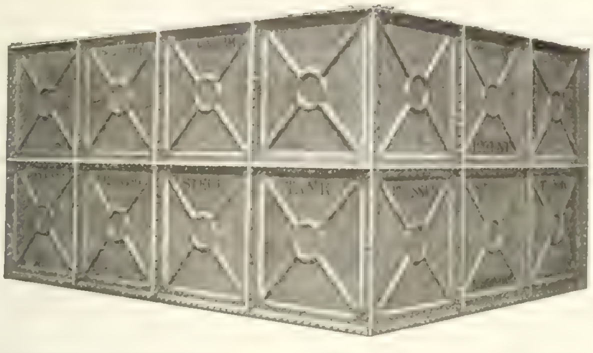


Capacity, 9600 Gals. Size, 16 x 12 x 8 ft. deep.

Patent Pressed Steel Tanks

are built up of plates 4 ft. square by 5/16th in. thick. There are only three types of plates and all are interchangeable. Easily erected by unskilled labor.

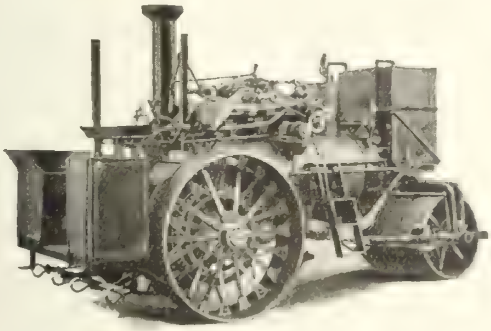
LIGHT. STRONG. CHEAP. UNBREAKABLE.

IMMEDIATE DELIVERY FROM STOCK.

STEEL PIPES—Welded or Rivetted

of any diameter over 12 inches and having any desired type of joint.

Thomas Piggott & Co., Ltd.
BIRMINGHAM
Cable Address "ATLAS BIRMINGHAM."



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A smooth and easy running engine. Twin cylinders are placed side by side on the top of boiler. Boiler has great steaming capacity, and produces most power for the fuel and water used.

Our Contractor's line includes single and double cylinder engines and rollers, scarifiers, sprinklers, dump wagons. Get our estimates on the equipment you need.

The Huber Manufacturing Co.,
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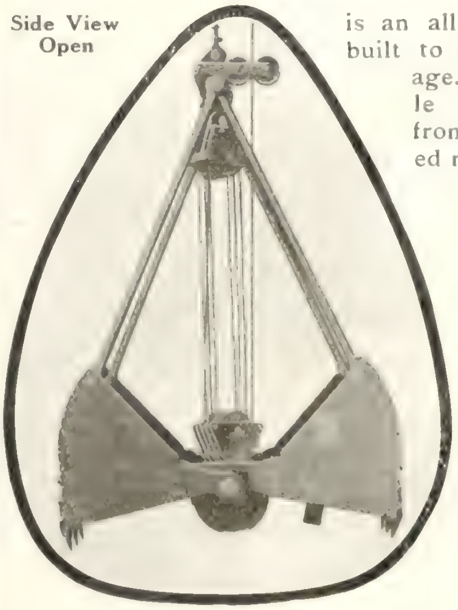
Canadian Representatives: F. H. Hopkins & Co., Montreal.

The
Owen Bucket

Side View Open



is an all round bucket, built to stand hard usage. It will handle any material from sand to crushed rock.

The Owen Bucket will dig like a steam shovel and is provided with detachable teeth for dredging.

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Galvanized Wire Wound and Continuous Stave Wooden Pipe

FOR
Municipal and Private Water Supply
Direct Pumping or Gravity Systems
Power Lines, Irrigation and Mines
WILL NOT
Rust, Rot, Burst, Freeze or Taint

Withstands 200 lbs. Working Pressure
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Tanks, Water Works Supplies, Complete Water Systems Installed

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The Mushroom System

is the Modern Method of Reinforced Concrete Construction for Bridges and Buildings

ELIMINATION OF BEAMS means money saved for owner and builder.

THE COST OF CENTERING is greatly reduced due to saving in Beam Framing.

STOREY HEIGHTS are reduced one or two feet per storey, saving in Brick Walls.

DISTRIBUTION OF THE METAL in Mushroom System Slabs gives the greatest efficiency.

The system is fully covered by broad patents in Canada, the United States, and all civilized foreign countries.

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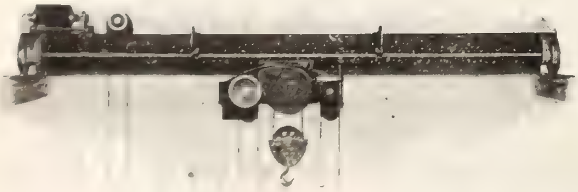

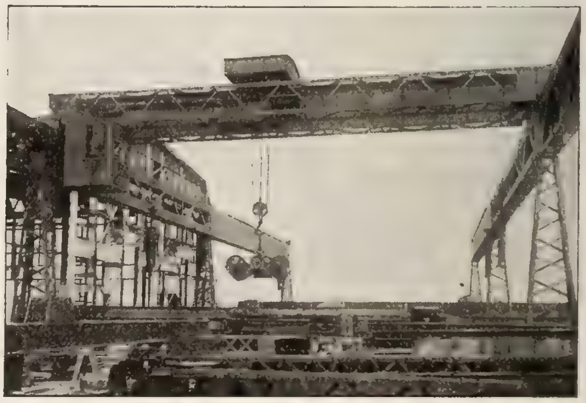

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ARE NOW MADE IN CANADA

Electric Traveling Cranes, Hand Traveling Cranes, all types and capacities —**Electric Hoists,** for every purpose.

Northern Crane Works, Limited

Former Name: Advance Machine Works Limited

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for Highest Efficiency, Absolute Reliability, Greatest Economy

**Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.**

Sizes 3 to 42" Diameter up to ¼" in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

Write for our Catalogue A and prices on your requirements.

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Crushed Stone

All sizes. For Roadways and Sidewalks also specially adapted for

Reinforced Concrete Construction

Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

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Head Office: 34 Yonge Street, TORONTO

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Established 1855 TORONTO
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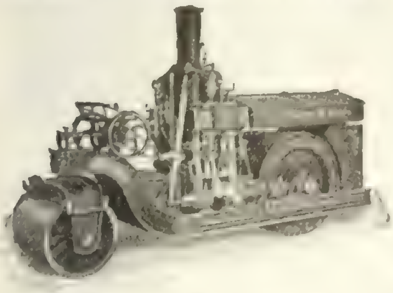

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P. W. DIETLY
Proprietor

Send for our Catalogue of Asphalt Rollers and Mixers.

"Our 20th Century Roller"

1303 PEACH STREET - ERIE PA.

The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading engineers. They are undoubtedly the most economical means of storing water at an elevation.
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

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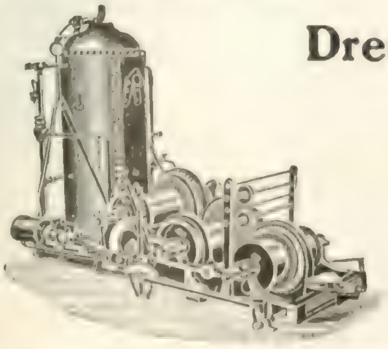
M. Beatty & Sons, Limited Welland, Ontario, Canada

Dredges - Ditchers - Derricks

Steel Dump and Deck Scows

Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery



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Who tender the bond of the

AMERICAN SURETY COMPANY

of New York

THE LARGEST SURETY COMPANY IN THE WORLD

will have a **Distinct Advantage** in bidding for work.

Owners are now insisting on . . **ABSOLUTE SECURITY** for the performance of contracts . .

26 East Wellington Street
Telephone Main 2609.

W. H. HALL, Manager, Toronto, Ont.

The
Missisquoi Marble Company
Limited

Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

Samples may be seen at District Sales Offices:—

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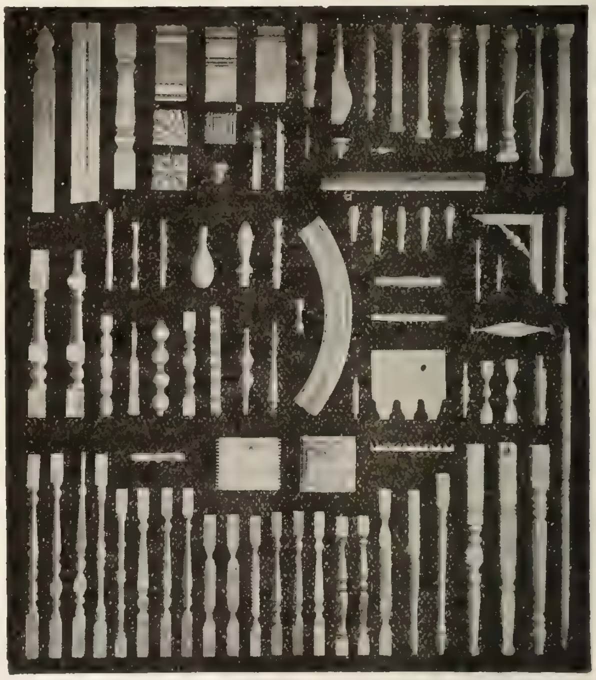

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Enamelled Woodenware, Dowels, Mailing Boxes, Pill Boxes, Pail Handles, Broom Handles, Paper Plugs, Knobs, and Turnings of all kinds

Enquiries Solicited

Automatic Wood Box and Turning Co.

Office and Factory : ETCHEMIN, LEVIS, QUE.

KAHN SYSTEM

OF REINFORCED CONCRETE

Steel Sash

Hyrib, Rib Bars, Rib Metal.

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Concrete Finishes

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KAHN SYSTEM Reinforced Concrete

Trussed Concrete Steel Co. of Canada, Limited

Head Office and Works—

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Branches everywhere

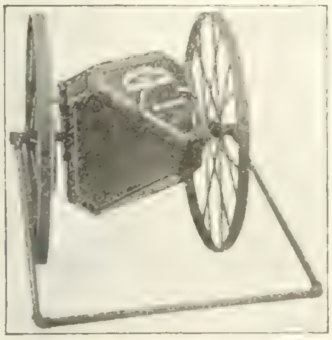
AMERICAN ENAMELED BRICK

will protect your investment.
No cost for maintenance, if you build right.

Write for new edition catalogue.

AMERICAN ENAMELED BRICK & TILE CO.
1182 Broadway, New York City

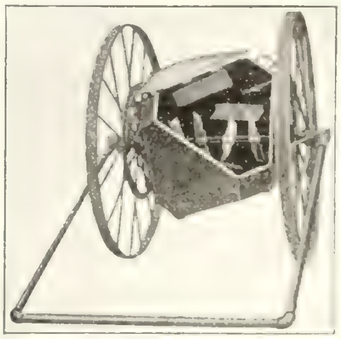
Arnold Concrete Mixer



A hand Traction Mixer Completely Operated by Two Men

NO CRANK TO TURN

Concrete Mixed While the Materials Are
Being Wheeled from the Stock
Piles to the Forms.



THE ONLY REALLY PORTABLE MIXER ON THE MARKET

It does away with the use of wheelbarrows, mixing boards and mortar boxes. Mixes, conveys and deposits, all in one operation. ONLY ONE HANDLING OF THE MATERIALS.

If You have No Mixer Here is Your Chance to Get One at a Low Cost, that will Enable You to Compete with Anyone

If you have a Power Mixer, you need the Arnold Mixers to use on your flat work and small jobs.
Capacity 15 cubic yards, mixed and placed, per 8-hour day.

Write today for full particulars to Agents wanted in unoccupied territory

240 Williams Street **F. T. ARNOLD** **New London, Conn.**

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6 Bin Plant Built for THE DAILEY COAL CO. BROCKPORT, N.Y.

The

Kon-Wald System

of

Steel Coal Elevators

will

Increase Your Profits

and

Decrease Your Labor

Write Now for
Information and Estimates

Kon-Wald Engineering Co.

Mutual Life Building, BUFFALO, N.Y.

Let This Sink In —

In every city in Canada the Underwood is used more generally than any other typewriter—in many places more generally than all other makes combined.

Why this pronounced preference for the Underwood ?

The Underwood is not a cheap typewriter—in fact, it costs a little more than others. But people do not buy the Underwood on a price basis. They buy it not for what it *is*, but for what it *does*.

THE Underwood does more. It has a multitude of uses—for bookkeeping, for order systems, for billing systems, check systems—for every kind of accounting, recording and statistical work, there is a special-purpose Underwood And the system, designed for your particular needs and which is made possible by the Underwood, is worth many times the price of the machine. This system service costs you nothing. You can't get it with any other machine at any price.

United Typewriter Co. Ltd.
Everywhere in Canada

THEW SHOVELS

STEAM SHOVELS
THEW
HORIZONTAL CROWDING MOTION
LORAIN
FULL CIRCLE SWING

The THEW SHOVEL has revolutionized the methods employed for cellar excavating, street grading, road construction, and light contract work in general.

The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

Send for Catalogue. C.R.

THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

7 Interesting Letters

1. Kramer Automatic Tamper Co., Madison, Lake Co., Ohio, Nov. 17th, 1911.
Peoria, Ill.

Gentlemen:—Replying to your favor of the 3rd inst., in regards to the working of the Tamper you sold me last Spring, I will give you a few of the remarks I hear everywhere I go in regards to my blocks, which I never heard before I got the Tamper. One man said he would sooner have my 8 x 8 x 16-in. blocks than any 8 x 10 x 16-in. hand tamped block made. Here is the last order I got. This is the way I received it. A gentleman came to my shop November 4th, and stood and looked at the Tamper running, while I was cleaning up. I told him I would be through in a few minutes. He said he just wanted to see it run, was all. He asked me what I wanted for my blocks.

I told him and he said, get me out 1500 soon as you can, and he is hauling them now. They ask me why I don't keep them on hand. I have given that up since I put the Tamper in. The only way I could get any ahead would be to sell the Tamper, and then I would get a yard full.

I have now at present, orders to make yet this fall, 2,500 blocks.

Sorry to say that I could not get you a photo of my place. I have built another large building, 30 x 60.

I should advise any block manufacturer to have a Kramer Tamper installed, as mine has paid for itself this season.

Now I have not told you how many you can make, as that depends on what kind of help you got. We have made 90 in one hour, and have made 3 in 1¼ minutes. If you want to know anything about the repairs, you can find it is not very much. The cost to me was only $6.00.

Hoping this will be satisfactory, as I could talk Tamper day and night, I will answer any letters, stamps enclosed.

Respectfully yours, CHAS. S. ELDRIDGE.

2. Kramer Automatic Tamper Co. Waterville, Maine, Nov. 10th, 1911.
Peoria, Ill.

Gentlemen:—After using your Automatic Tamper nearly two years, making Miracle Double Air Space Blocks, I have only words of commendation for the work the machine does. Blocks can be made faster, and much easier and of better quality, than by hand tamping. Yours truly,

EMERY HILL CON. CO.
Edwin Towne, Treas.

3. Kramer Automatic Tamper Co. Hampton, Iowa, Nov. 14th, 1911.
Peoria, Ill.

Gentlemen:—The Automatic Tamper that I bought of you last Spring at the Chicago Cement Show has given the best of satisfaction, both as to quality and quantity of blocks produced.

As to the quality, the machine tamped blocks weighing about ten per cent. more than the hand tamped, proving that the machine tamped blocks must be more dense.

I use facing on all blocks, and make the concrete wet enough so that the water shows on the outside of the blocks when removed from the machine.

I consider the tamper will double the output of a crew of two, three or four men. As to speed, four men have made five 8 x 8 x 24-in. with facing and carried them away to cure in five minutes and twenty seconds. Yours truly,

G. E. SARGENT.

4. Kramer Automatic Tamper Co., Cleveland, Ohio, Dec. 12th, 1911
Peoria, Ill.

Gentlemen:—In regards to your letter of the 7th inst., on the merits of your Tamper installed in my shop, I must say I have seen several different kinds of tampers, but have not seen any which I would trade mine for. I installed it about 18 months ago, and have had very little trouble with it.

I would not part with it for $5,000 if I could not get another one. No block maker can afford to be without one, because it makes a much better block than you can make by hand. Yours truly, H. P. BENNETT,

5. Kramer Automatic Tamper Co., Lafayette, Ind., Nov. 17th, 1911.
Peoria, Ill.

Gentlemen:—After having used "The Kramer Automatic Tamper" in connection with the making of all cement blocks, we are pleased to report that it has proven satisfactory in every respect, and that we are well satisfied in every respect with the results obtained.

Heretofore it was practically impossible to produce the market blocks as we wished, but since the installation of your Tamper, all the "hand tamped" defects have been eliminated, which has created a demand for "Kramer Automatic Tamped Blocks."

Owing to the simplicity of the "Kramer Automatic Tamper," it very seldom needs attention, and as yet, after good hard usage, has not inconvenienced us in the least.

We will be glad to recommend the Kramer Automatic Tamper to any one, at any time, so do not hesitate to use us. Yours very truly,

HENRY J. KESSENER LBR. CO.
Will D. Kessener, Treas.

6. Kramer Automatic Tamper Co., Lincoln, Nebr., 16th, 1911.
Peoria, Ill.

Gentlemen:—In answer to your favor of the 4th inst., will say that we have had in use a Kramer Automatic Tamper, which has given perfect satisfaction.

The Tamper, unlike men, never tires, and as it is easily operated, the men can work fast the entire day. In our shop three men who do their own mixing, we turn out daily eight hundred linear feet of stone.

Thanking you for this opportunity to make public our approval of the Kramer Automatic Tamper, we are,

Very truly, THE REIMERS KAUFMAN CO.

7. Kramer Automatic Tamper Co., Valley City, N.D., Dec. 11th, 1911.
Peoria, Ill.

Gentlemen:—Regarding your letter of the 8th inst., I will say that your Tamper has given me good service. [illegible]

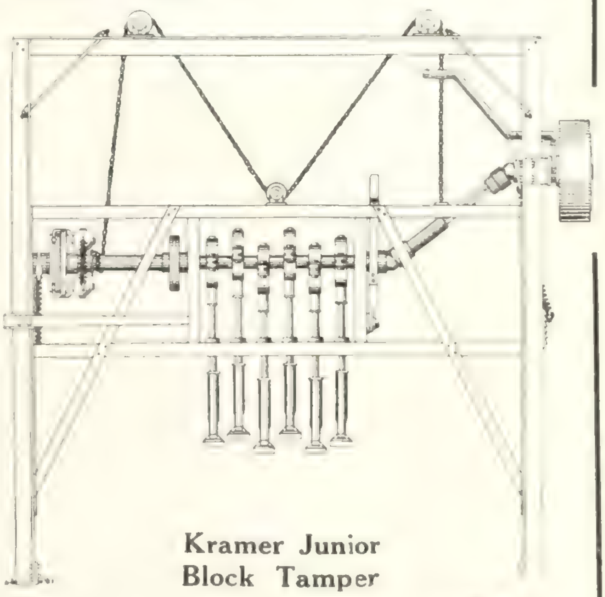
[illegible] in ten hours, and besides, I can use them a good deal sooner, and find that I have a good deal better results. The Tamper puts more material in them than can be done by hand. And I have a good deal better sales and twice the satisfaction. Yours most truly, W. J. CURREN,

Kramer Automatic Tampers

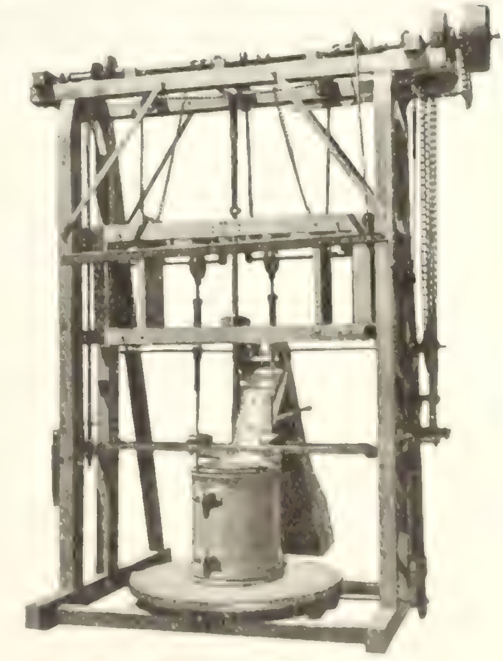
THE KRAMER JUNIOR BLOCK TAMPER is built of steel and is a great achievement for simplicity and durability. The tampers are mounted on springs, making the stroke an elastic one. These springs also act as a shock absorber, which enables the lightest and frailest kind of a block machine to withstand the terrific tamping exerted by it, without wrecking the mold box.

It will successfully work on any size or style block machine. It will increase the output of your plant over 100 per cent., and reduce the cost fully 50 per cent.

The correctness of our statement is vouched for by hundreds of satisfied users.



Kramer Junior Block Tamper



The Kramer Tile Tamper

A real machine for making [illegible] Tile. It has two tampers striking 600 blows per minute; it will tamp Tile to any density, either drain or sewer Tile. Let us tell you about these machines. Write to-day.

Kramer Automatic Tamper Co.

423 S. Adams Street - - PEORIA, ILL.

Hobbs Lens Back Prism

Far Superior to Ordinary Flat Back Prism. Samples mailed on request. :: :: ::

Hobbs Mfg. Co., Limited

FACTORIES AND WAREHOUSES:
London, Toronto, Montreal, Winnipeg

Leaded Art Glass

Memorial Windows **Metal Glazing**

Get our estimates on this work. We are prepared to turn out work promptly and reasonably.

Colonial Ornamental Glass Co.
838 Bank St., Ottawa, Ont.

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Quarries and Mills at Bedford, Indiana, and Bloomington, Indiana

Producers of Dark Hollow Buff and Blue
Hunter Buff and Blue Oolitic Limestone

Celebrated

Bedford Stone

from our quarries has been used in many of the largest public buildings, churches, etc., in the United States and Canada.

Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

General Offices
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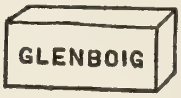
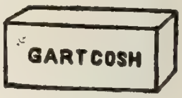
Toronto Agent
A. P. STEWARD - Builders' Exchange

Do You Handle

Fire Brick?



Every
Glenboig Brick
bears the brand



The undisputed supremacy of GLENBOIG FIRE-BRICKS make them the easiest to sell. There is a big demand for them.

"Glenboig Bricks" have stood the test of extreme heat without cracking; quick changes of temperature and without expanding or contracting.

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Alexander Gibb
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For Sale for Immediate Delivery

1—Buckeye Trench Machine, cuts trench 15 in. x 5½ ft.
1—Buckeye Trench Machine, cuts trench 28 in. x 7½ ft.
1—Buckeye Trench Machine, cuts trench 36 in. x 12 ft.
1—Parson Trench Machine, cuts trench 24 in. to 60 in. x 20 ft.
1—Municipal Trench Machine, cuts trench 24 in. to 72 in. x 20 ft.
1—26 ton Little Giant Traction Shovel.
1—45 ton Vulcan Track Shovel.
1—No. 0 Thew Full Circle Shovel.
1—No. 5 Austin Crusher with Corrugated Head and Back Gear.
1—No. 5 Gates Crusher Style "K" with smooth head in excellent condition.
1—No. 5 McCully with new head and new shaft.
1—Set of 16 in. x 36 in. McCully Rolls.

CREAM CITY EQUIPMENT COMPANY
600 Majestic Building, Milwaukee, Wis., U. S. A

The Dahlstrom Products

A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors. It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.

Dahlstrom Metallic Door Co.

The Dahlstrom Products

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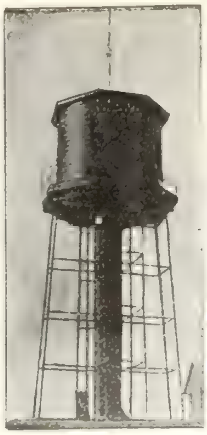

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Windmills, Gasoline Engines, Hydraulic Rams, Etc.

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Increases Factory Output

Good Light Mutual profits. Good light increases the workman's efficiency and thus his wage earning power. Good light increases the manufacturer's outfit and his net earnings. **The "Humphrey" Factory Gas Arc Lamps** flood the factory with light in the best and cheapest way.

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Night View of one of the buildings of

THE RUSSEL MOTOR CAR COMPANY

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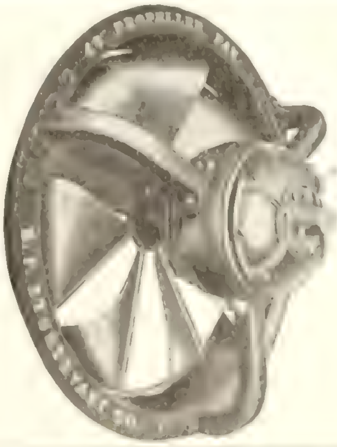
For VENTILATING and COOLING



The design of our Propeller Fans is along the same scientific lines as all our fan product, and that is why Sturtevant Propeller Fans deliver more air for the same size fan and with less power expenditure than any other propeller type made. The construction is particularly strong and durable.

They will quickly change the air in factories, workrooms, kitchens, billiard halls, etc., carrying away the smoke, Fumes, hot air, keeping the atmosphere sweet and cool.

The electric fans are equipped with motors wound for either alternating or direct current. They may be installed in any position and controlled from any point desired.

Ask for Bulletin No. 116 K

B. F. STURTEVANT CO., HYDE PARK, BOSTON, MASS.
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Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete

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was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

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Use Herringbone Metal Lath

THIS KIND

on the ceiling of your kitchen. Steam is constantly rising and wood lath warps and cracks the plaster.

Why Herringbone?

Because it doesn't bag under the trowel. This makes it the most economical to plaster.

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Metal Shingle and Siding Co., Manufacturers

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Architects and contractors who cater to this class of men will be acting directly in their own interests by specifying this brand

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3 inches to 60 inches diameter

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A Tale of Four Cities

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Building Permits

1911	$17,652,642
1910	13,150,365
1909	7,258,565
1908	5,950,883
1907	5,632,744

WINNIPEG

Building Permits

1911	$17,550,000
1910	15,116,450
1909	9,226,325
1908	5,513,700
1907	6,309,950

TORONTO

Building Permits

1911	$24,374,539
1910	21,127,783
1909	18,139,247
1908	11,795,436
1907	14,225,800

MONTREAL

Building Permits

1911	$14,579,932
1910	15,715,859
1909	7,785,621
1908	5,062,226
1907	8,406,229

showing the extraordinary activity of building operations in Canada's leading commercial and industrial centres. This is typical of the growth and development of the whole Dominion. **Do you want information** on all Building and Engineering projects contemplated or in course of construction throughout the whole of this country? **If so,** we can furnish you with **Daily, Detailed, Verified Reports,** obtained by our own staff of reporters, each one of whom is assigned a definite territory. These Reports will tell you who is buying, what is wanted and where the buyers are. They will tell you where there are opportunities for your making sales. Competition is keen—are you as well posted as your competitor or does he slip in just ahead and win out? Do you know what business is offering each day from every part of Canada. Perhaps there's a solution—**Perhaps** it's MacLean Daily Reports—think it over. Write to our nearest office.

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Montreal

Established 1882

THE COMMERCIAL

The WEEKLY FINANCIAL, COMMERCIAL & GENERAL TRADE NEWSPAPER of the GREAT WEST

WINNIPEG

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 per cent. off for wholesale:—

		Star.	D.D.
10 to 25	united inches........	$4.25	$ 6.25
26 to 40	“	4.65	6.75
41 to 50	“	5.10	7.50
51 to 60	“	5.35	8.50
61 to 70	“	5.75	9.75
71 to 80	“	6.25	11.00
81 to 85	“	7.00	12.50
86 to 90	“	...	15.00
91 to 95	‘	...	17.50
96 to 100	“	...	20.50
101 to 105	“	...	24.00
106 to 110	“	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$2.65	$4.05
40	2.85	4.50
50	3.25	4.81
60	3.45	5.50
70	3.75	6.32
80	4.25	6.87
85	4.70	7.70
90		9.07
96		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock .... net $1.75

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 65; iron, 65 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent

Iron Pipe

Size (per 100 ft.)		Black.			Galvanized
¼ Inch	......	1.80	¼ Inch	......	2.57
⅜ “	......	1.80	⅜ “	......	2.57
½ “	......	2.35	½ “	......	3.23
¾ “	......	2.75	¾ “	......	3.83
1 “	......	3.93	1 “	......	5.48
1¼ “	......	5.35	1¼ “	......	7.49
1½ “	......	6.44	1½ “	......	8.98
2 “	......	8.05	2 “	......	11.46
2½ “	......	12.85	2½ “	......	18.30
3 “	......	16.86	3 “	......	24.03
3½ “	......	22.57	3½ “	......	33.65
4 “	......	25.65	4 “	......	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS
(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $7 per 100 lbs. per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 95c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 92c. per gallon of 9 lbs.

Turpentine, in barrels, 69c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs.

Business Notes

Coatsworth, Ont.

The Pere Marquette railway station was completely destroyed by fire, together with all furnishings. New and complete equipment required.

Hamilton, Ont.

Hamilton Facing Mills completely gutted by fire, loss about $10,000. Will rebuild at once, new machinery required.

Montreal, Que.

Warehouse and office building at 105 Lagauchetiere street, owned by Wm. Carter, destroyed by fire. Other firms and buildings suffering loss are R. C. Miller, agent for mill supplies; the Canadian Cocoanut Co.; W. J. Kearns Co., printers; The Dominion Lithographing Co.; John Fee, machinist.

Nelson, B.C.

The Vancouver lumber mills of the Dominion Saw Mills Co., Winch Bldg., were destroyed, including rolling mill, planer, engine room and all machinery and mechanical equipment.

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

CLEVELAND & ERIE MACHINERY CO.
1515 Rockefeller Bldg., Cleveland, O

MUSKOKA CRUSHED STONE AND SILICA SAND

All sizes best macadam for good roads. The best for sidewalks and all classes of concrete work. Prices right. We sell car loads only. Prompt shipment. Crushing capacity, [illegible] tons per day. Sand fine and coarse silica for special work. Core sand for foundries. See Samples. Phone Main 3712. **Canadian Opportunity Co.**, Suite 1002, Kent Bldg., Toronto.

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CONTRACTOR
Greensville - - Ont.

Driller of Oil, Gas, Salt or Artesian Wells
Deep Wells a Specialty

20 YEARS' EXPERIENCE IN CANADIAN OIL FIELD

Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.
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BUILDERS:
P. Lyall & Sons, Limited, Montreal

Associates: E. G. Bird, Toronto; Ross & McFarlane, Montreal

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Galvanized Expanded Metal Lath and Corner Beads Used Exclusively

The PEDLAR PEOPLE LIMITED

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OTTAWA. . . . 423 Sussex St.
TORONTO . . . 111-113 Bay St.
CHATHAM . . . 200 King St. W.
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REGINA . . . . 1901 Railway St. S.

CALGARY . . . Room 7, Crown Block.
VICTORIA . . . 434 Kingston St.
ST. JOHN, N.B. . 42-46 Prince William St.
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To the frequent question, "Will 'Prime White' road oil produce all the results of the black road oils?"

NO

1. It does not last as long as a good black oil (Asphaltoilene).
2. It is not a road binder.
3. It does not, like all black oils, require an engineer or special machine for applying it.
4. It does not leave any black stain or muck.
5. It will not track on the side walks or into houses.
6. It will not soften and be nasty in wet weather or spring.
7. It will not stop traffic for a moment.
8. It will not require a top dressing.
9. It will not soil shoes, clothes or carpets.
10. It will not meet the requirements of engineers who are seeking the impossible or impractical.

IT WILL

1. Lay the dust on any road.
2. It will be clean, odorless and colorless.
3. It will leave no black dirty mess to be tracked into houses.
4. It will improve and preserve any road.
5. It can be applied any time of year.
6. It costs only a fraction of any black oil.

BUT

Don't take our word (or anybody's). See it for yourself.
Ask for sample of "Prime White". (It costs you nothing).
Also illustrated book, "Road Bitumens, Their Scientific Use and History."

"Prime White" Road Oil Co.

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The 10 and 11 Models of the

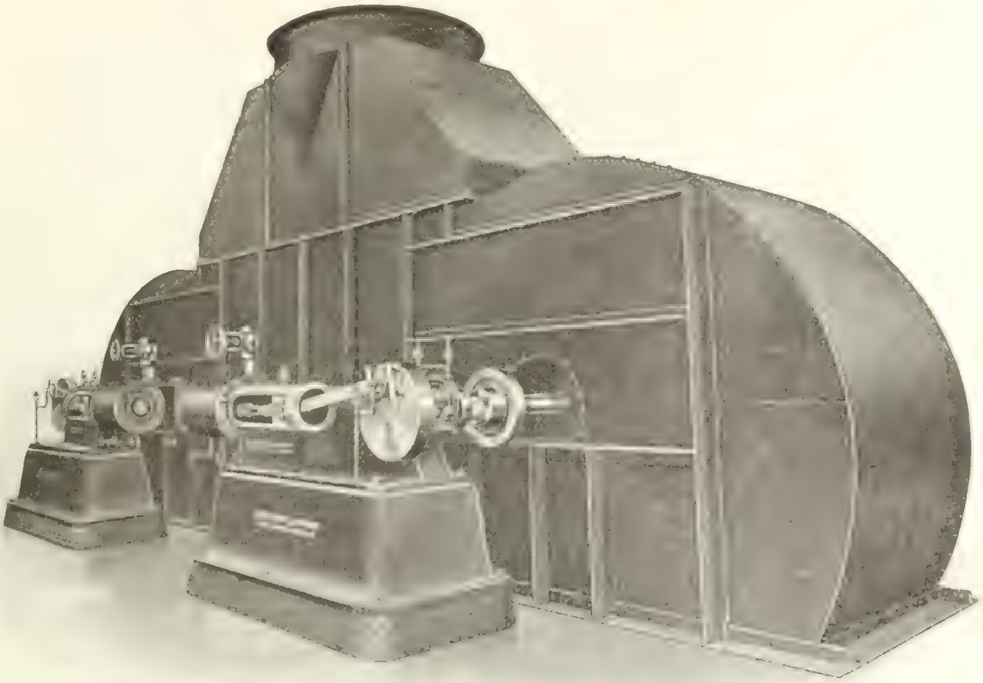
Remington Typewriter

are Visible Writers —and More

These Remington models supply visible writing under new conditions—without loss of efficiency.

To realize what this means—the combination of Remmington strength with visible writing — note the type bars. Note them specially. See how they are hung in a double row. This gives room for the broad pivot bearings. Note the bar itself, the strong, rigid bar, the Remington Bar you have always known, made from a steel drop forging. Compare this bar with the ordinary thin bar, stamped out of sheet steel, and you will understand one reason why the very name "Remington" stands for Strength and Reliability in a Typewriter.

Remington Typewriter Company
(Limited)
144 Bay Street, Toronto



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Forced and Induced Draft
Mine Ventilating
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And Other Purposes

Sheldons Limited

Galt, Canada

The Absurdity of the Open Elevator Well

AN elevator, dumbwaiter or other kind of shaft creates, in case of fire, the most powerful and destructive draft imaginable. Fires naturally follow the direction of air currents. The more powerful the draft, the more surely and more quickly are the flames swept along by these air currents—growing in their ferocity and velocity.

Every one is familiar with the great rush of air up elevator wells—increasing proportionately to the height or depth of the shaft. Literally, these shafts are chimneys—with an opening on each floor.

Flames are irresistibly drawn to the elevator well. They sweep to this igniting all in their path, bursting forth at every opening. The rapid spreading of the fire is inevitable.

The absurdity of open elevator wells has been clearly demonstrated thousands of times. Even now, in many of our supposedly perfect buildings, this simple but no less positive rule has been ignored.

Every elevator shaft should be securely closed. It should not be possible for a fire to spread by the elevator shaft route. There is no excuse for any opening in the elevator shaft doors. If there is an opening, it should be closed with heavy wire glass. To wilfully violate "what experience has taught" is openly inviting danger.

If nothing else in the building, present or future, is fireproof, the elevator well should be totally "boxed in" with The Dahlstrom Products. Better still, The Dahlstrom Products should replace all the obsolete inflammable trim of a building which permits a fire to eat its way from room to room or floor to floor.

Complete literature may be had upon request from our nearest branch office or direct.

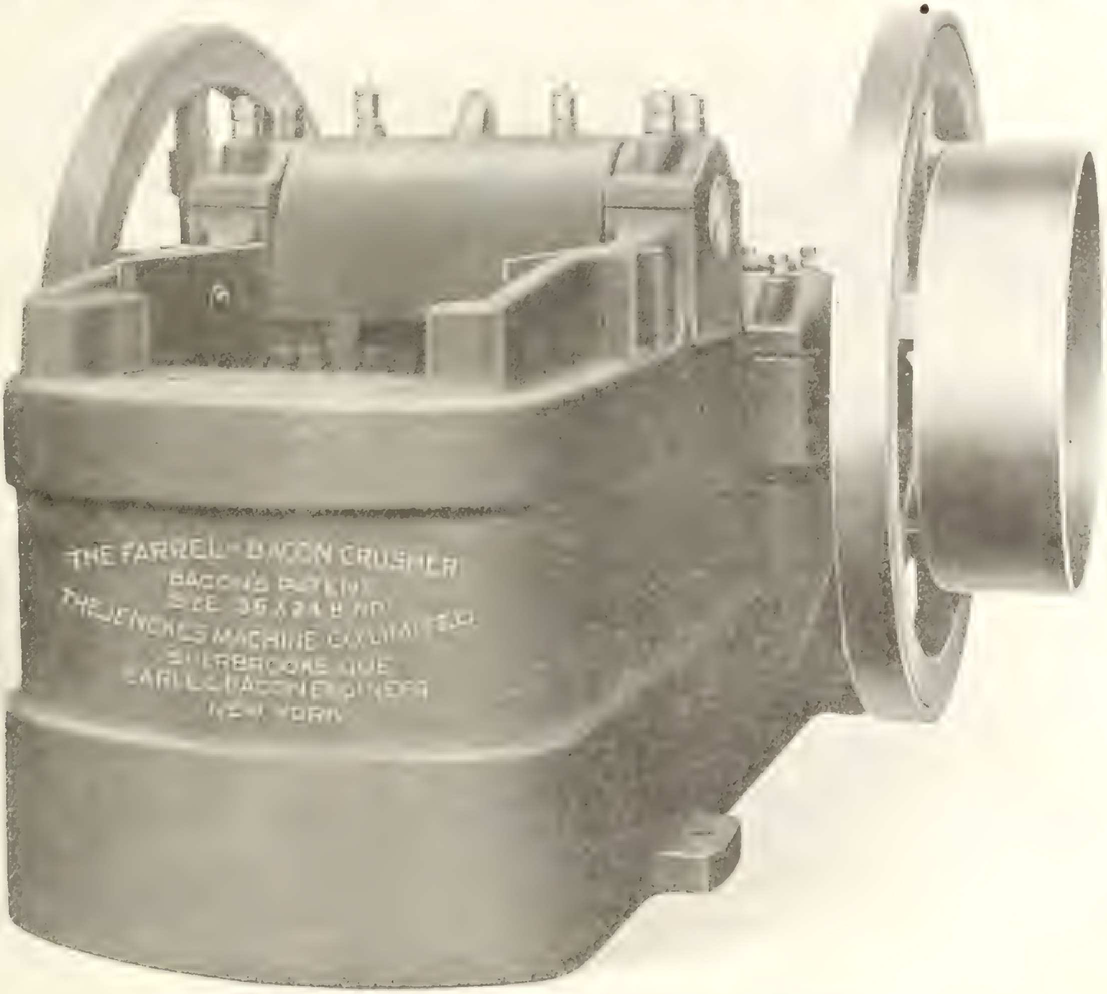
Dahlstrom Metallic Door Company

Executive Offices and Factories, 17 Blackstone St., Jamestown, N.Y.

Branch Offices in all Principal Cities

DAHLSTROM PATENT DOOR
ARTISTIC EVERLASTING
SANITARY AND FIREPROOF

THE JENCKES MACHINE COMPANY, LIMITED



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Ore and Rock Crusher

Patented

Sizes 42x26 and 42x30 inches **Numbers 26-B and 27-B**

DIMENSIONS, CAPACITY, PRICE, ETC.

No.	Size of Rec'g Capacity	Approximate Capacity in Tons per day of 10 hours—ANY ONE of the dimensions				Size of Pulley	Revs. of Pulley	H. P. Required	Total Weight	Weight of Heaviest Piece	Price with Chilled Iron Jaw Plates	Price with Steel Jaw Plates
	Inches	Tons Ins.	Tons Ins.	Tons Ins.	Tons Ins.	Inches			Lbs.	Lbs.		
26-B	42 x 26	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$	$
27 B	42 x 30	1500 Tons from 6 to 8 inches				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$	$

Sizes No. 26 and 27-B are especially designed and constructed for breaking down large size material to sizes stated, saving expense of sledging; and for the hardest kind of rock or ore.

In ordering, or in writing for information, as to size, etc., best adapted, state kind of rock or ore to be broken, for what purpose, and the size of product required.

The capacities stated in list are approximate, and based on a rock or ore that is hard and friable, and vary according to the nature of material to be broken; and the horse power varies somewhat also, according to the character of material to be broken, that given in table is a fair average; but it is always well to arrange for surplus power.

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Plants: Sherbrooke, Que., St. Catharines, Ont.

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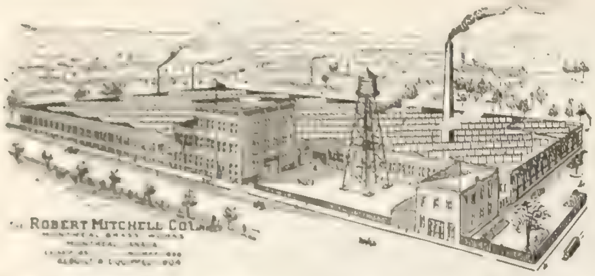
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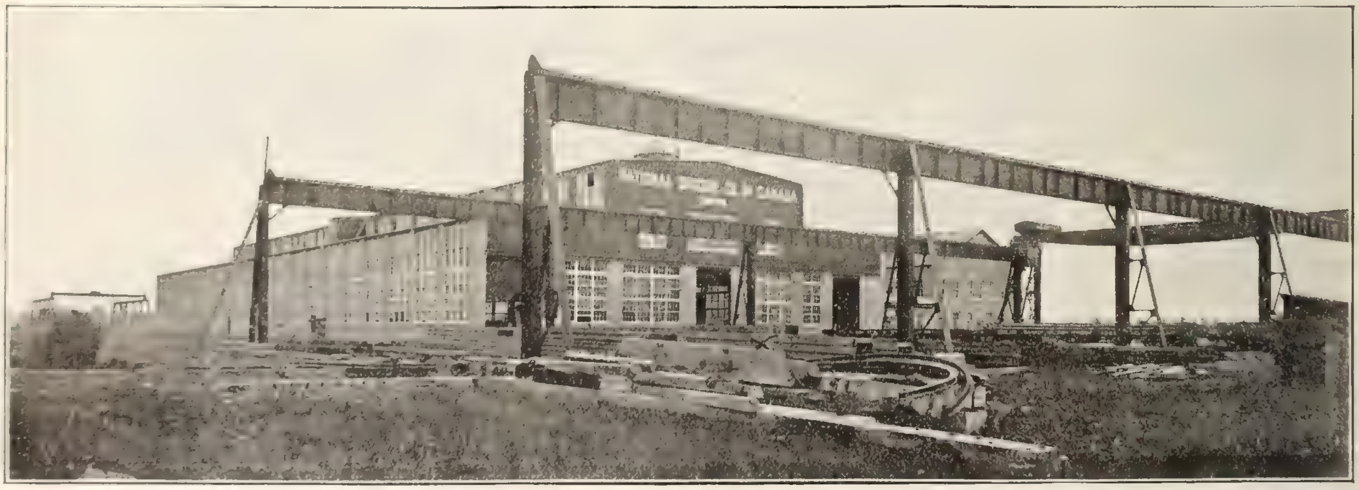

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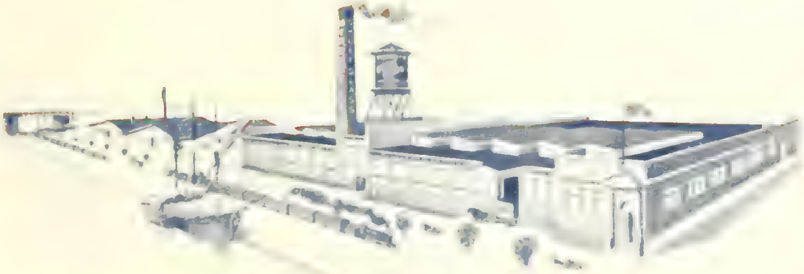

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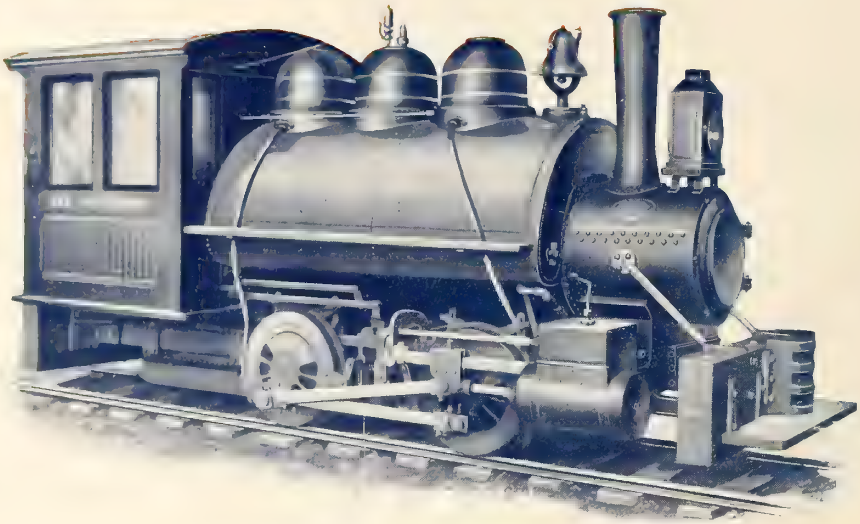

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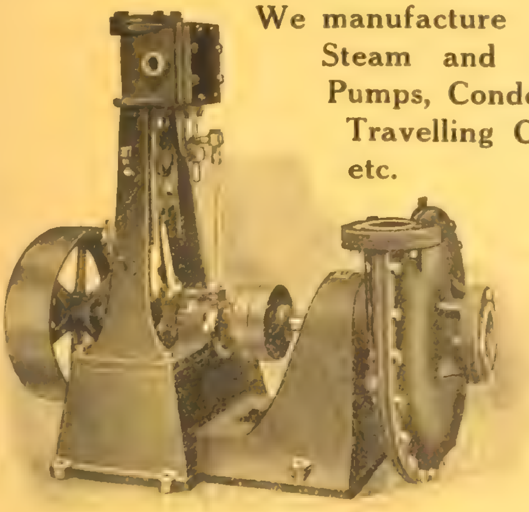
ESTABLISHED 1886

Contract Record and Engineering Review



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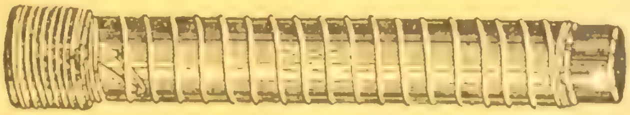

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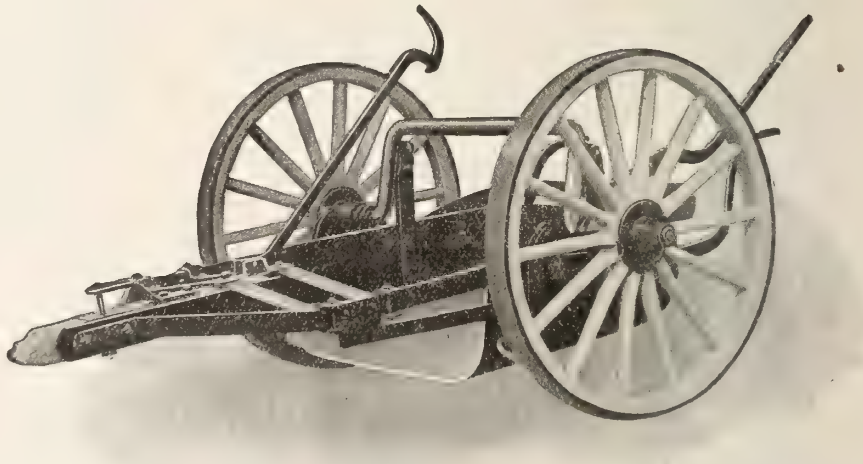

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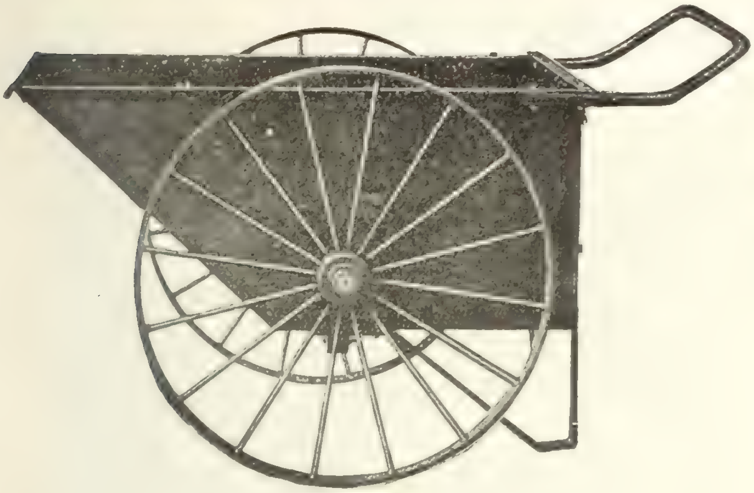

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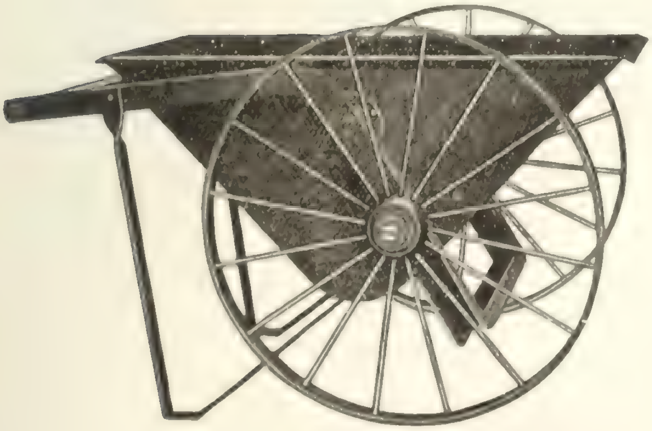

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(Continued on page 12)

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The
M-C Mixers
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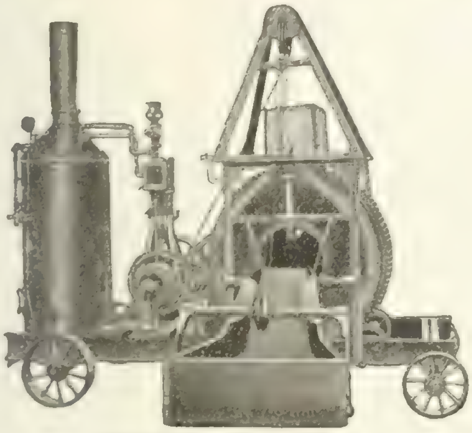

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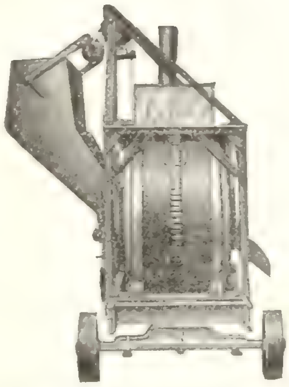
The many improved features of the London Mixers have placed them in a CLASS BY THEMSELVES.



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WE CAN SAVE THE CONTRACTOR'S MONEY.

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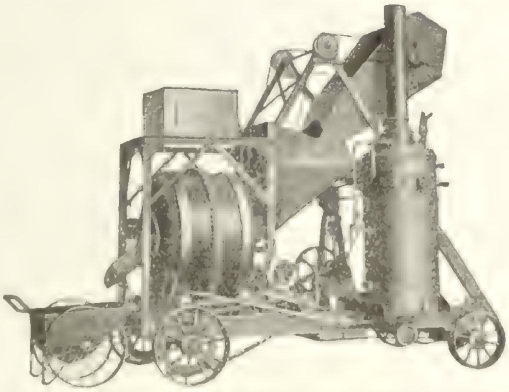

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Our Machines are not made down to a price, but MADE UP TO A STANDARD.

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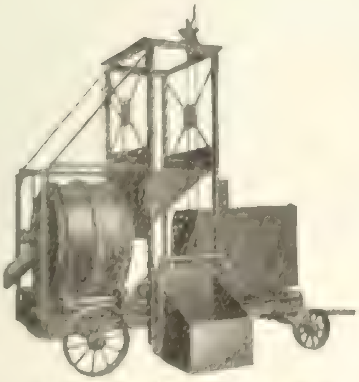

Paving Machine with side loader

We manufacture a full line of Concrete Machinery and Cement Working Tools. Also a full line of Hoisting Engines and Contractors Equipment.

We are the Largest Manufacturers of Concrete Machinery in Canada.

No. 2 Automatic Batch Mixer

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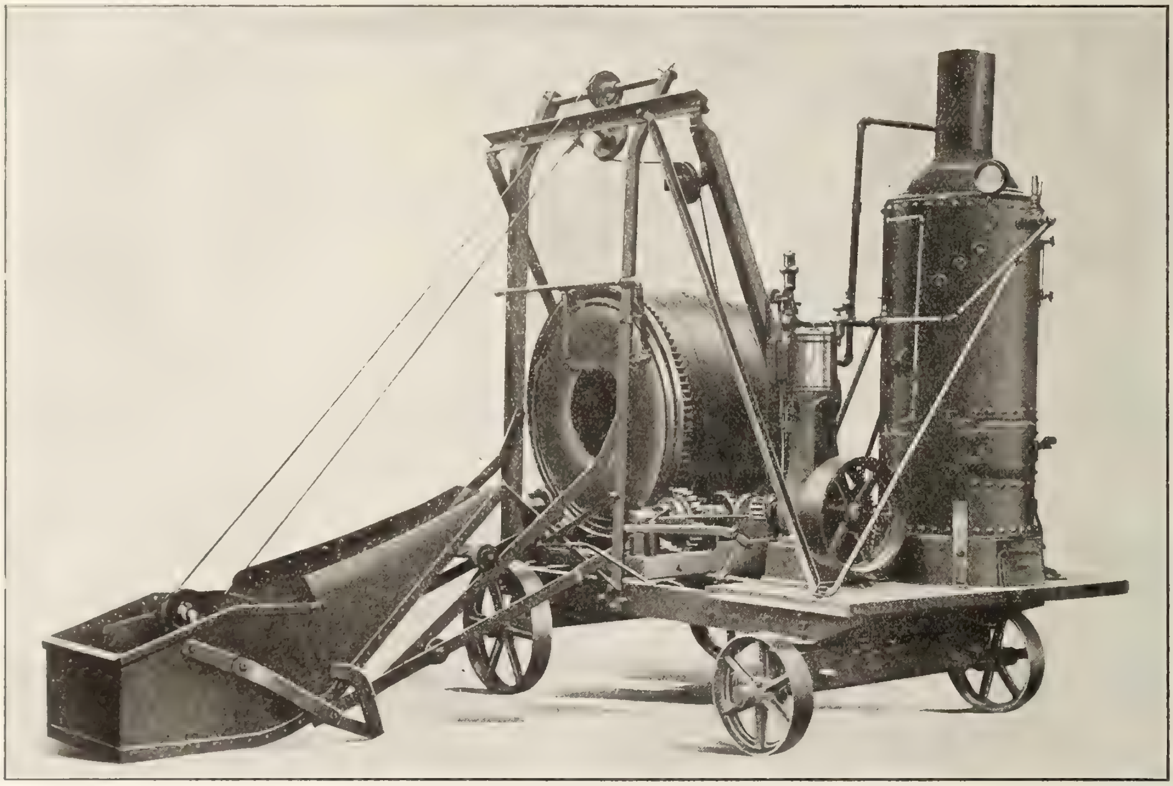
WETTLAUFER

Heart Shaped Mixers



The purchase of a reliable mixer of recognized make at the outset of a contract will save you money and time all along the line.

The Wettlaufer Heart Shaped Mixer means:

Low Cost of Maintenance, Capacity, Strength and Durability

Our New Automatic Dumping Device means, **rapid discharge, greater capacity** with **reduced labor.**

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Quick, Positive and Perfect

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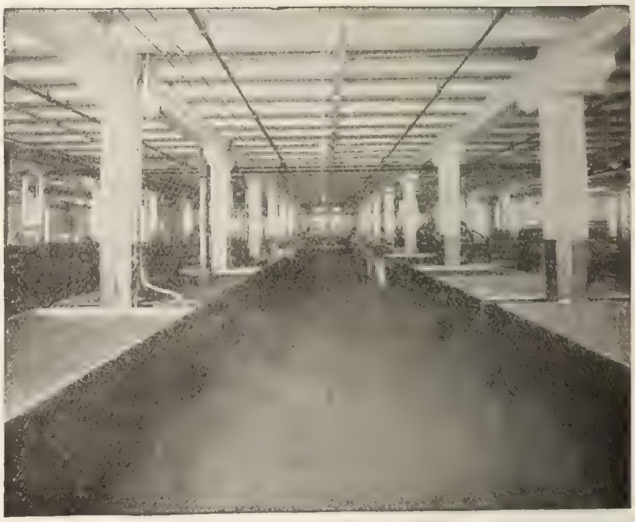

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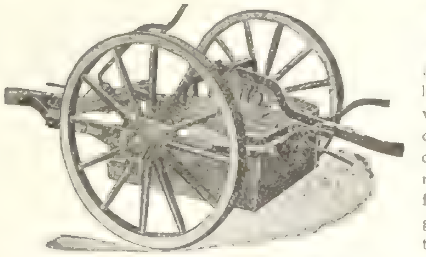

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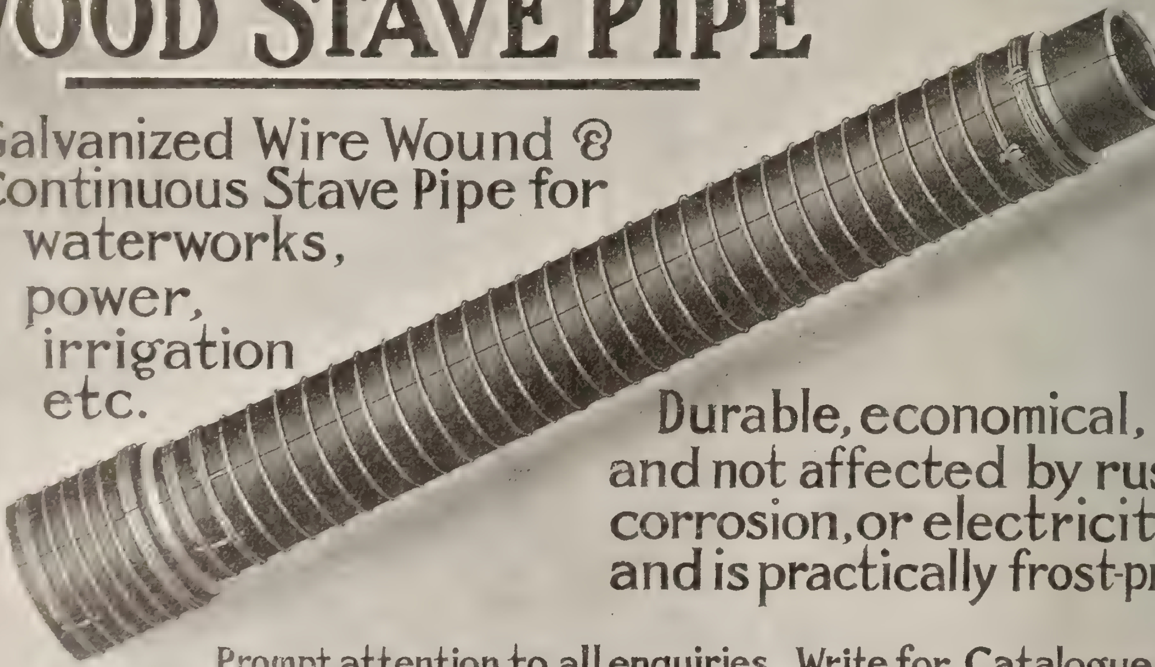

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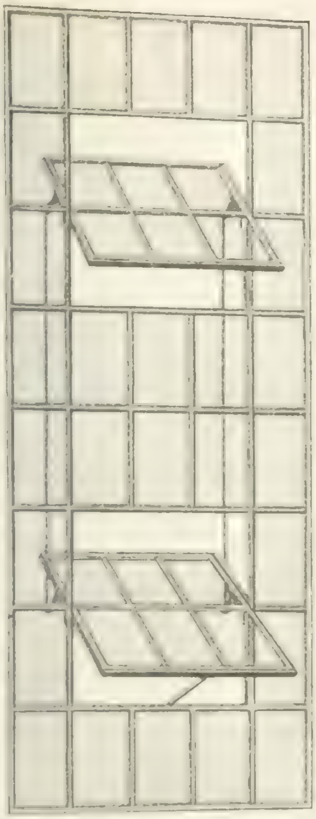

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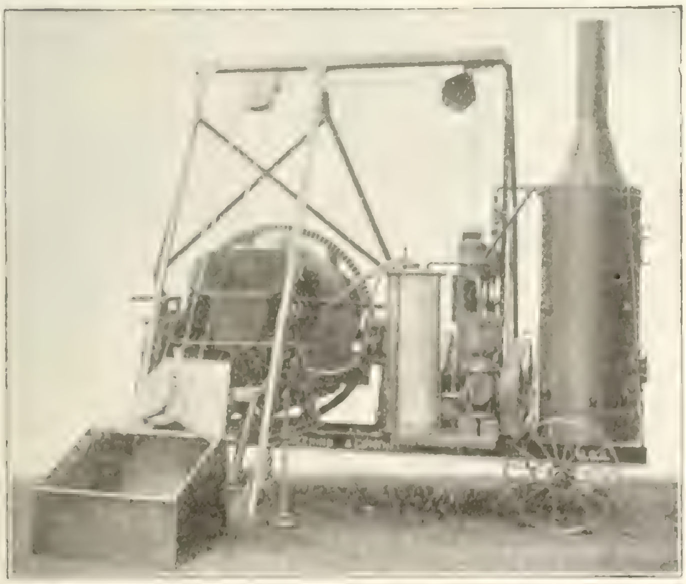

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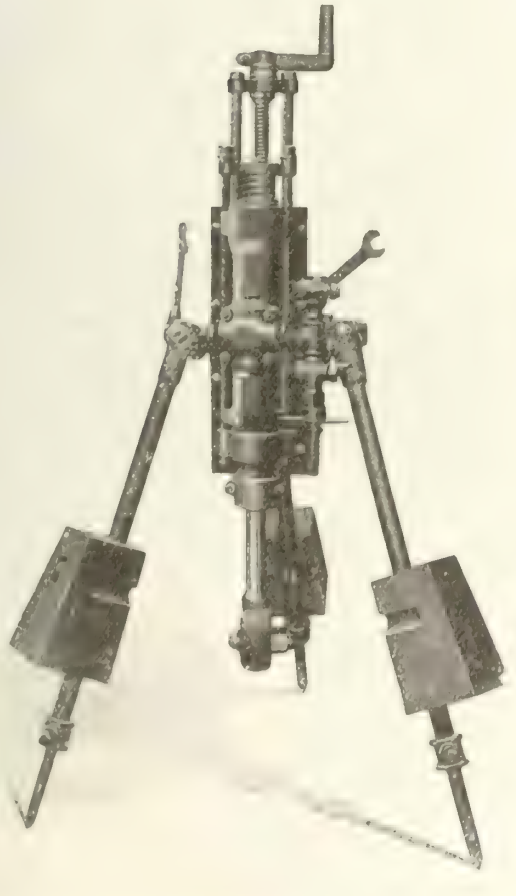

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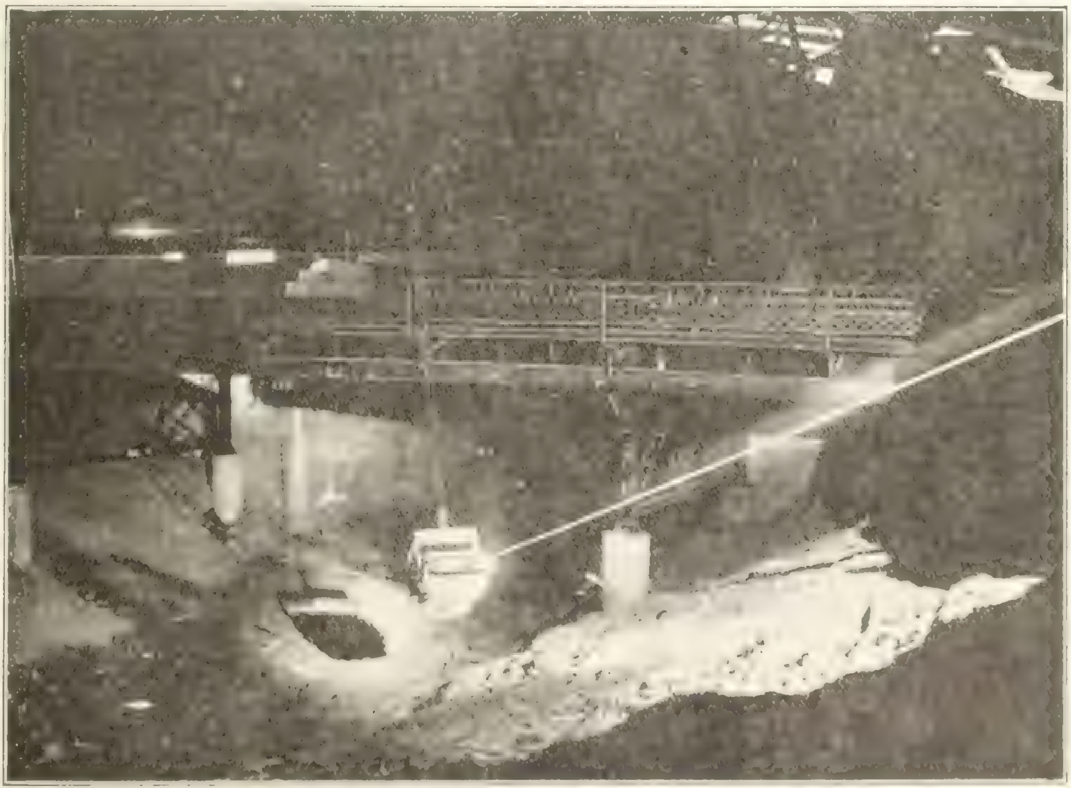

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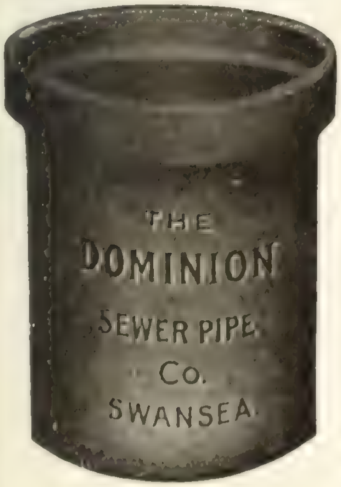

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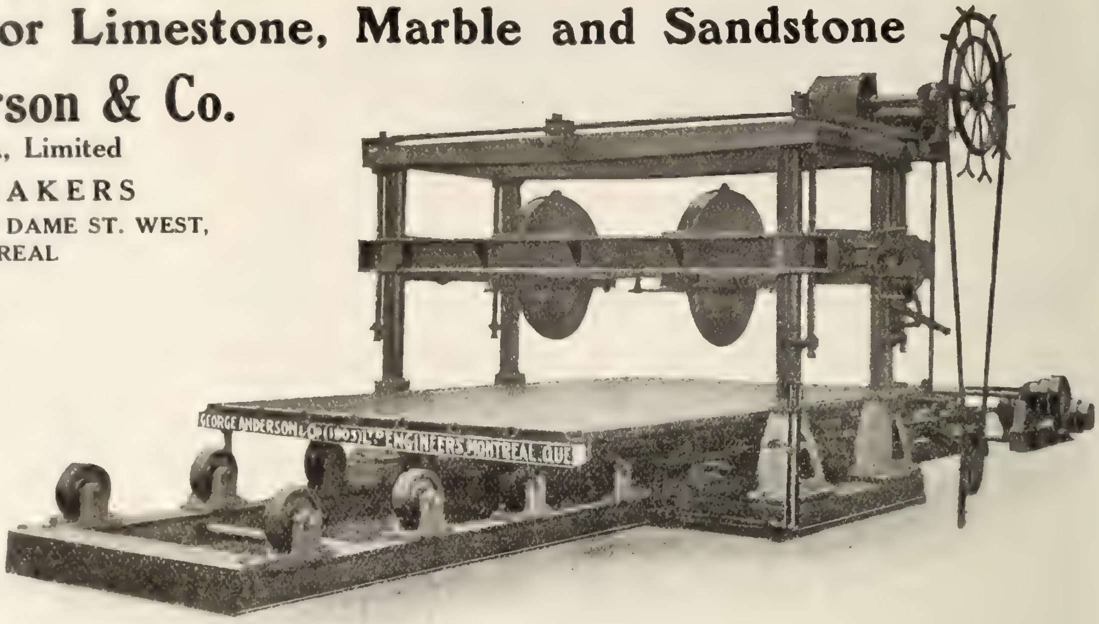

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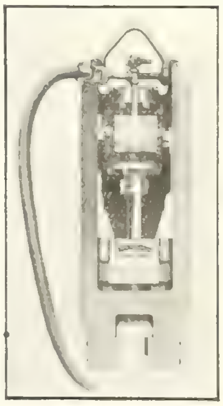

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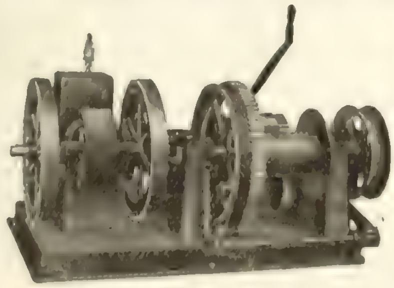

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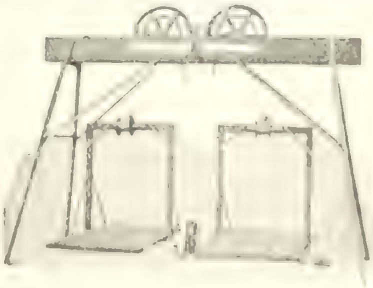

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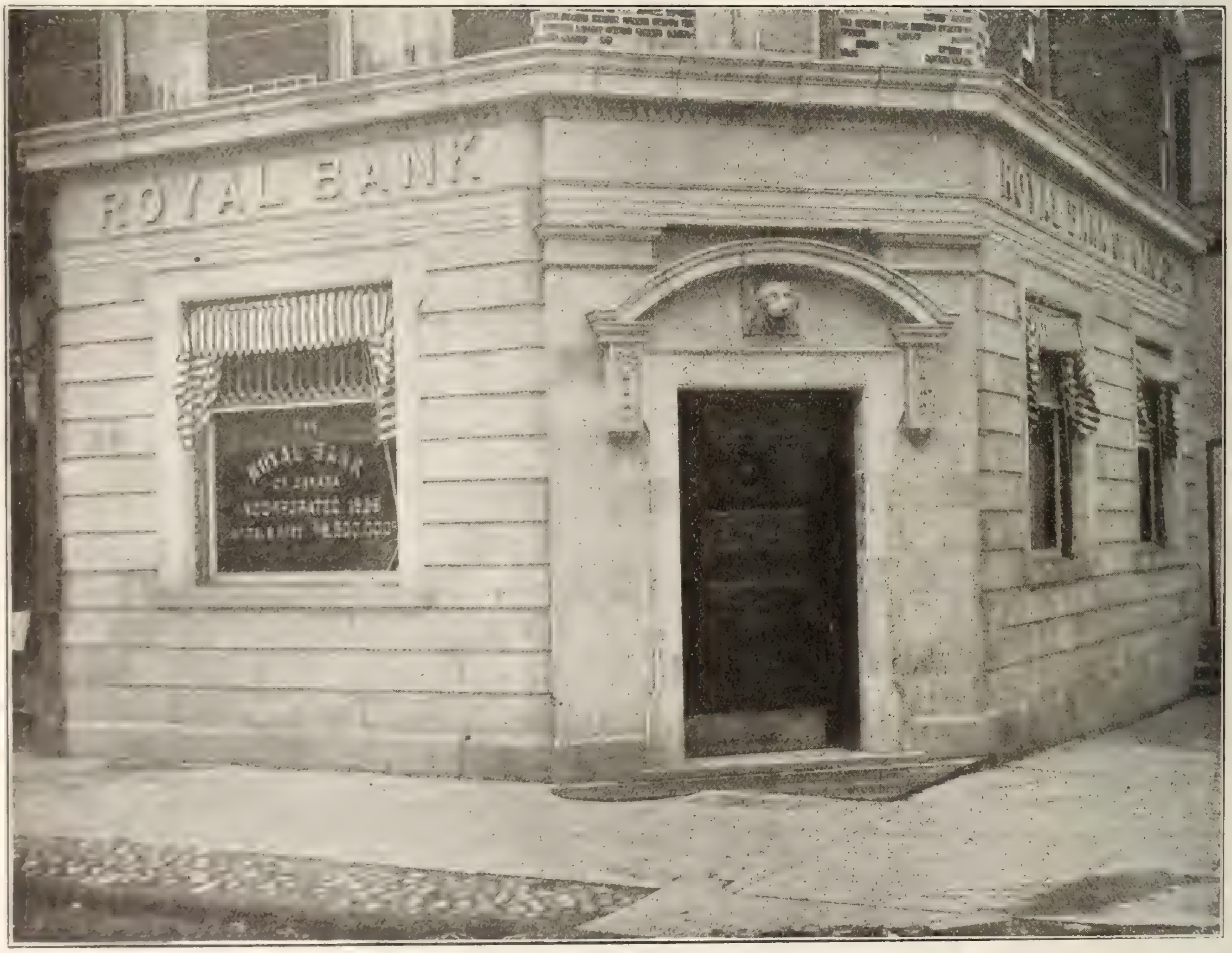

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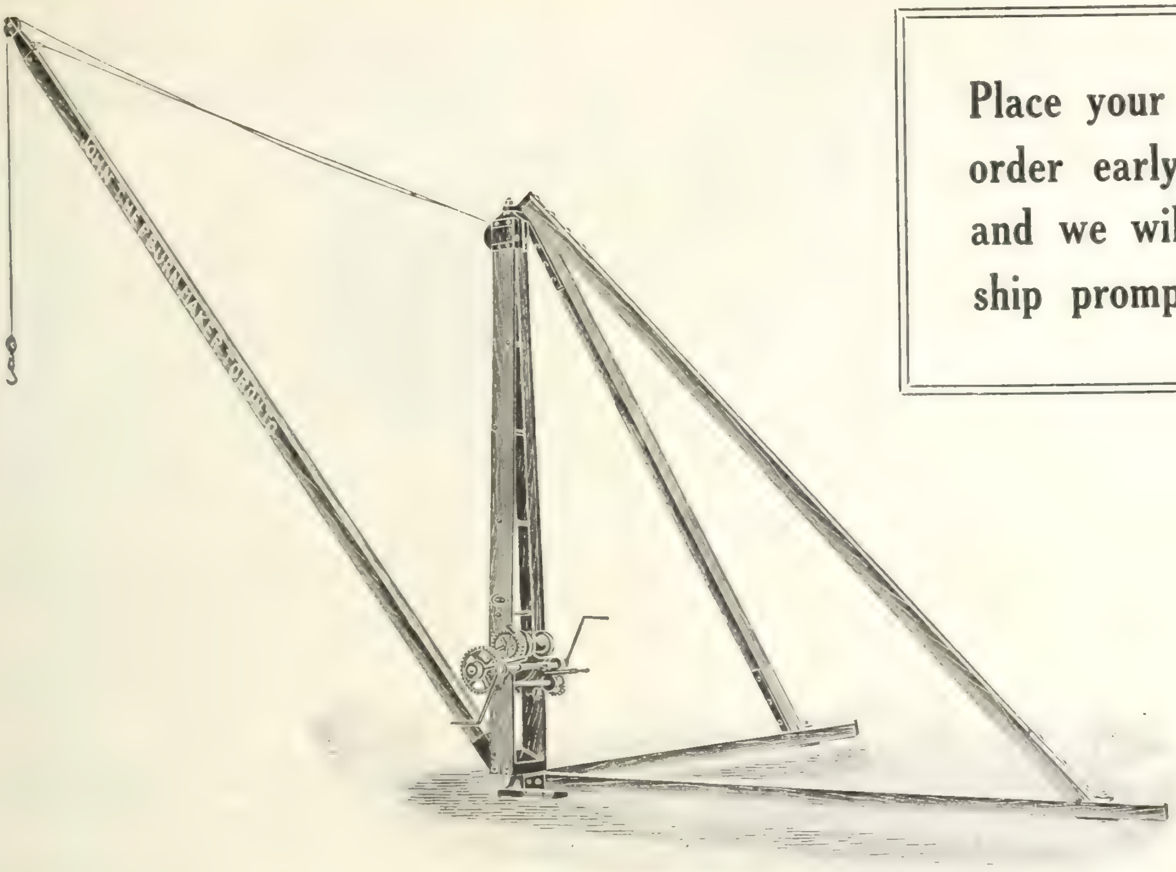
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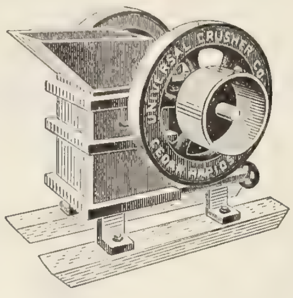

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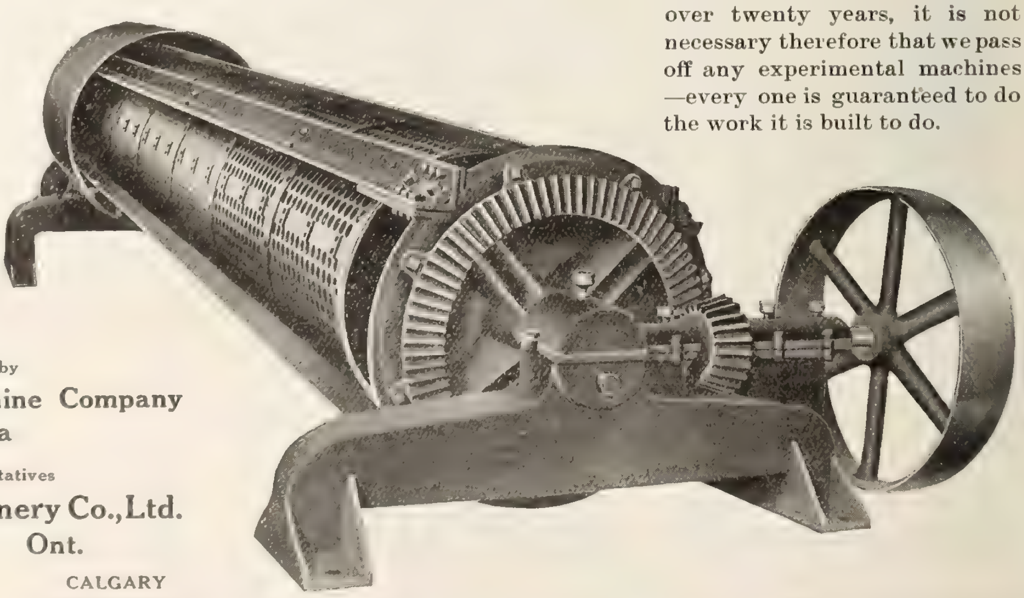

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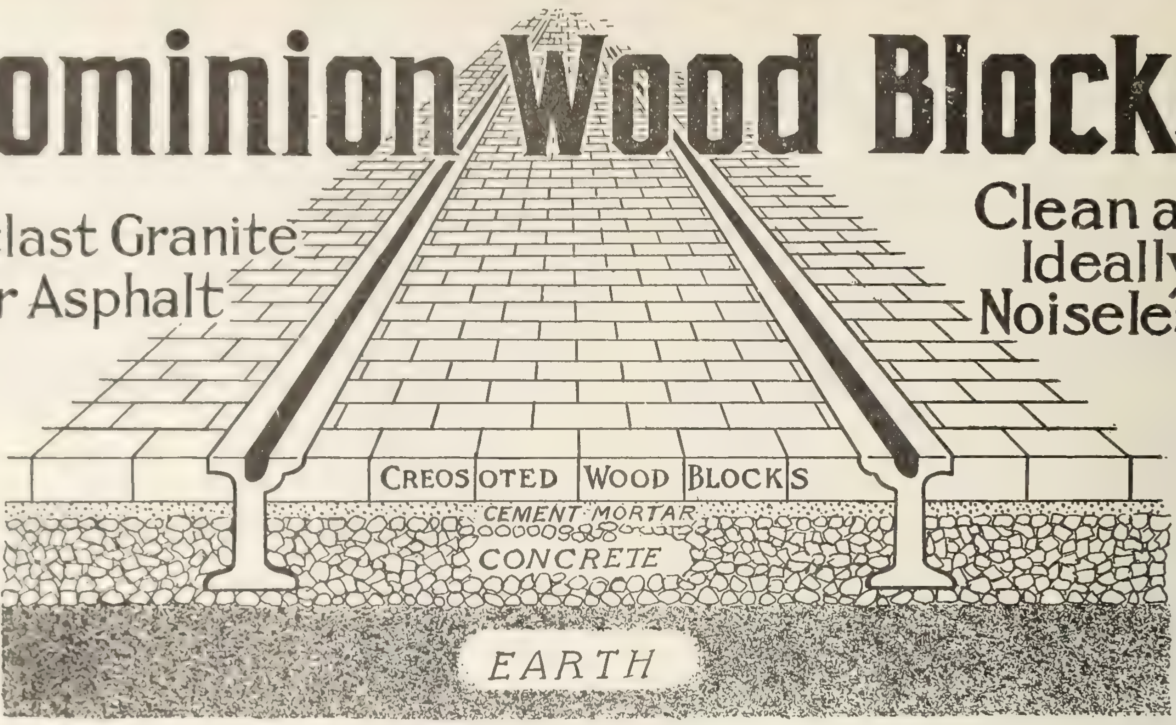

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May be in the eating; which seems also to suggest ease of early dissolution. The exact reverse applies to the PROOF OF A

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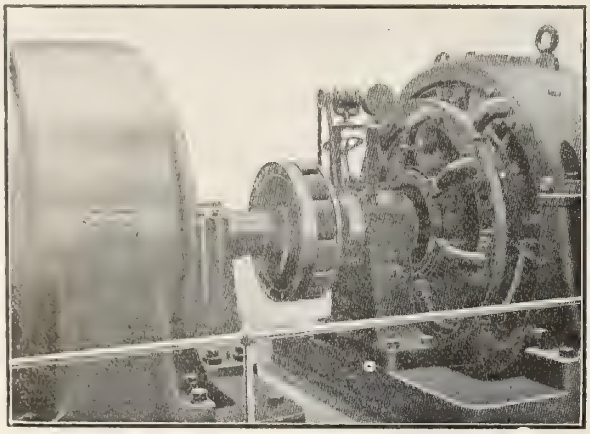

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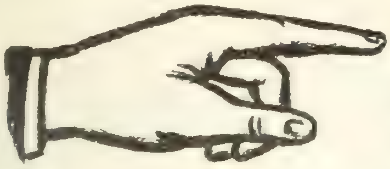

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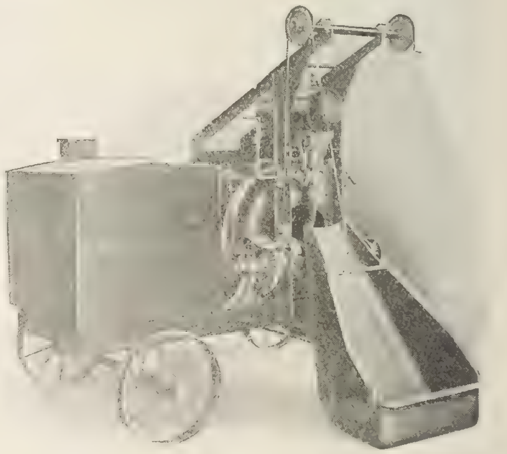

With a Koehring Paver you can lay concrete base at Least Expense

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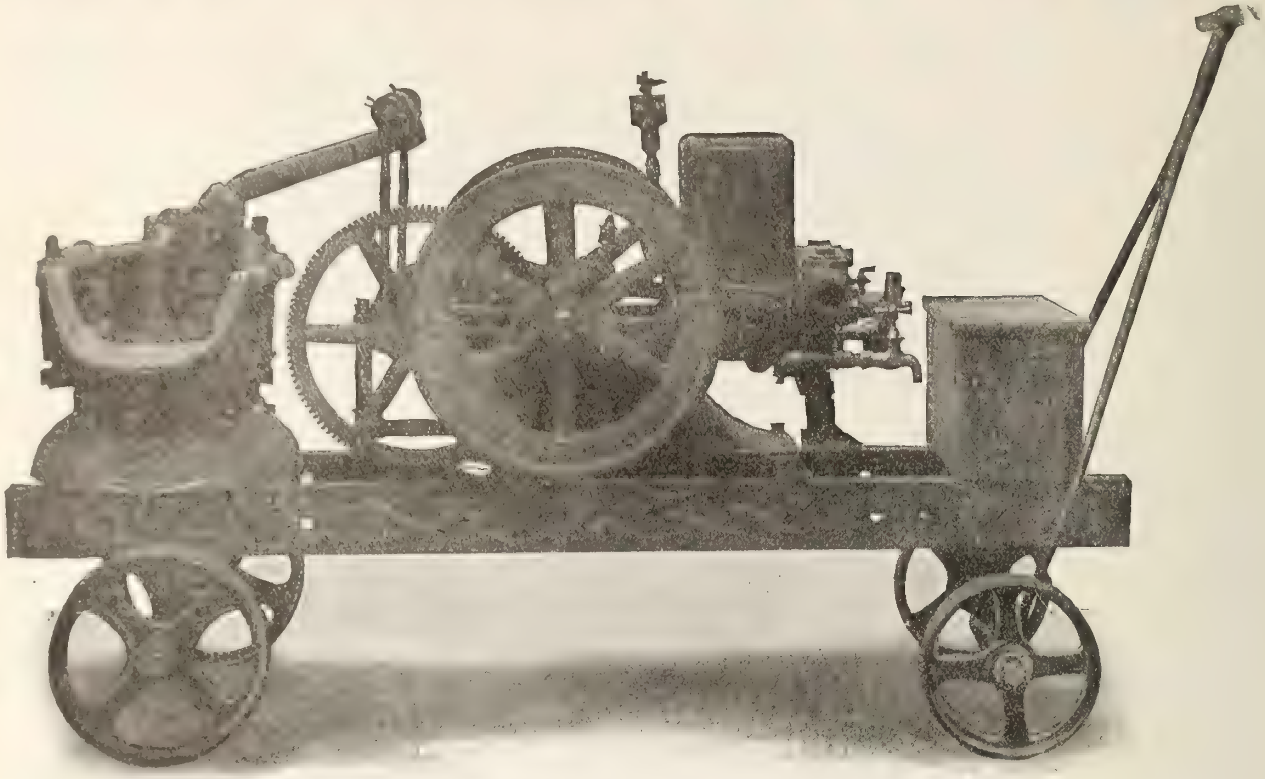

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Capacity		Cost of operation
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Saving

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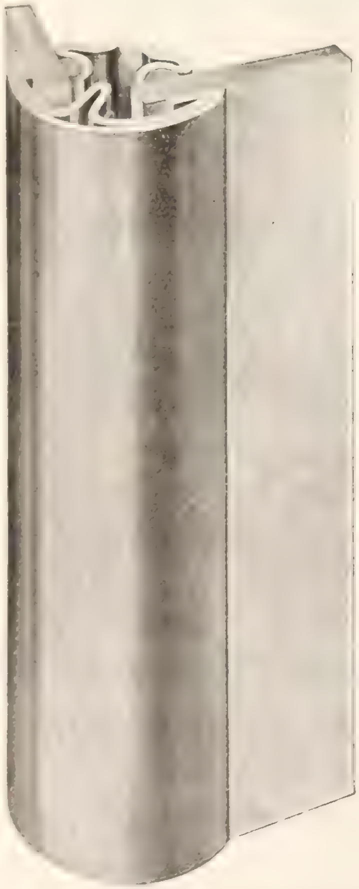
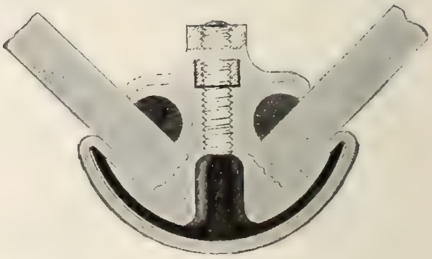


The Hester Corner Bar



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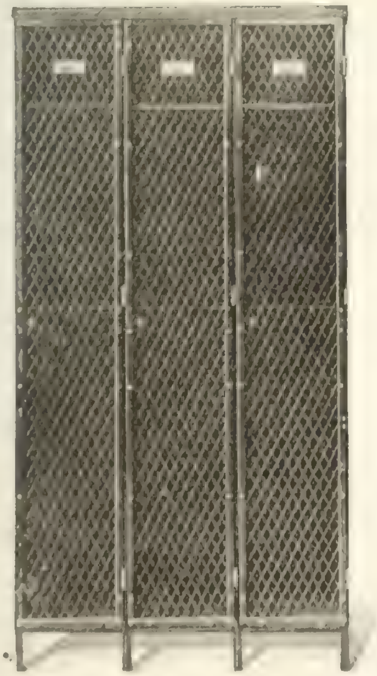

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Mr. C. H. Rust—Valedictory

IN Canadian municipal engineering circles there is one man at least who has the good sense to seek fresh fields of endeavor rather than come to his professional end "facing fearful odds."

City Engineer Rust has been in the service of the city of Toronto for thirty-five years. There are many men who at Mr. Rust's time of life would have made the best of the unsatisfactory conditions associated with their work and remained in a place that had become dear to them by virtue of such long association. But Mr. Rust is not hampered with either traditions or sentiment.

Now that he is going, the city of Toronto awakens to his virtues. The daily press which, while never having conducted an open campaign against him, has published verbatum and without comment or defence the peurile attacks that have been made upon him, now lauds him as one of the leading engineers of the continent. The older and more experienced citizens speak with open regret of his departure. The lilliputians of the city council are silent.

Such open recognition as this is not usually earned by a man during his lifetime. Particularly is this true in the municipal engineering profession. In Canada, usually, the City Engineer is only honored in the event of his sudden death—and this, happily or otherwise, seldom occurs.

So that, all things considered, Mr. Rust is to be congratulated. He is an Englishman by birth and he is going to a delightful part of the country that is peopled by conservative men for the most part of the same extraction. He has the best wishes of a large circle of friends. He is acclaimed by the new and lamented by the old.

The municipal pages of Toronto's history are one long record of folly. The wise men are driven out by the fools and the latter remain to repeat their ludicrous performances and to be recalled over and over again by the majority vote of a deluded public. We have said ludicrous performances, but it were better to substitute the word lamentable, for "it is to laugh" no longer.

We have discussed so frequently the conditions surrounding the work of city engineers that it would be superfluous to make extended comment at this time, but we cannot refrain from emphasizing once more the lesson which the city council of Toronto is teaching the rest of the country. A detailed account of the proceedings of this notorious body might be published in book form under such a title as, "How Not to Govern and Develop a City." Toronto affords a conspicuous example of what might have been but for vacillation and ignorance.

Concerning Quantity Surveyors

WITH all respect to the wide experience of Mr. C. E. Deakin, of Montreal, whose criticism of the quantity surveyor suggestion is published in another column, we cannot but think that he has entered into this discussion with a strong bias—perhaps the natural bias that comes of doing a certain thing in a certain way for a number of years. At the outset Mr. Deakin summarizes his views by saying that the furnishing of quantities on building work "means nothing"—the reason advanced being that a careful examination of the plans is absolutely necessary in any case, and that the true value of quantities can be arrived at in no other way. In this connection one need hardly express some agreement with the writer, but in regard to old country practice, and also as touching upon the expense incurred, Mr. Deakin's observations may be enlarged upon. The atmosphere is cleared somewhat by a perusal of the advertisements contained in recent issues of the leading British engineering publications. In calling for tenders for sewage disposal and refuse destructor works, with the erection of a number of buildings, for the Teddington Urban District Council, it is stated that drawings and specifications may be inspected upon application at various offices; then follows this clause: "A copy of the Bill of Quantities and Form of Tender may be obtained on deposit of a crossed cheque for Five Guineas, made payable to the Council, which deposit will be returned on receipt by the Council of a bona fide Tender." The above conditions are typical of standard municipal and general procedure in Great Britain, and we are still inclined to the opinion that this practice, as compared with our own, facilitates the operations of the contractor and effects a considerable saving. As to liability for inaccuracies in the bills of quantities, the responsibility would most certainly lie with the municipality or other corporation.

Again, how often are not the plans themselves defective when the quantities are taken off? How often has not the bidder, when in doubt, endeavored to cover himself by the addition of a sum for contingencies? With a well-drawn set of plans, careful specifications, and ample time allowed in which to put in a figure, jobs are very frequently let for cost or less than cost to a bidder who has left out some item which should be included in the contract. With plans that do not show clearly the requirements of a job, or with indefinite specifications, [illegible] or detailed drawings or too short a time in which to bid, buildings are generally let for more than their actual cost plus a reasonable profit.

On the face of it, from the builders' standpoint, it would seem that to the contractor the furnishing of quantities would effect a saving of time and expense in tendering, and that it would minimize losses sustained through mistakes. Obviously, also, there are many reasons why the practice should appeal to the architect and the owners. We hold no brief for quantity surveyors, but we still ask: "Are the merits of the system outweighed by its demerits?"

"Scientific Management Gone Mad"

In our issue of April 10, 1912, we made so bold as to criticize the developments of scientific management. Our main contention was that scientific management totally disregarded human contingencies; that scientific management should become a factor in business "only in so far as it provided for systematization of work and the methodical planning thereof." After pronouncing such judgment it is refreshing at least to find the "Engineer" of London, Eng., defining Taylorism (the system of management which has just been examined and reported against by the United States Government) as "scientific management gone mad." We cannot refrain from reproducing the introductory remarks contained in the editorial comment made by our contemporary.

"Anyone who studied for a few months the engineering papers of America would come to the conclusion that the worst managed shops in the world were those of the United States. Paper after paper contains articles on shop management, on scientific management, on the Taylor system, the Gant system, bonus, premium and piecework systems, on the use of card indexes, on route cards, on shop costing, and so on, and so on, ad lib. The continual striving for something different implies discontent with existing things, and we are thus led to the conclusion that the Americans themselves deem their systems bad and unsatisfactory. A man in perfect health takes no interest in his internal mechanism; he is not continually overhauling it, patching, mending and altering it; he is so well satisfied with it that he forgets its very existence, and it is only when he becomes conscious of it that he knows he is unwell. The American works manager appears to be continually conscious of his organization. There seems to him always to be something wrong with it, and he is for every trying new experiments on it."

The Engineer and the Contractor

An engineer's faith in the honesty of contractors and his definition of the attitude of his profession towards contractors are related in a recent paper by Mr. Charles T. Main, mill engineer and architect, of Boston. Mr. Main says:

"Reliable contractors are honest and intend to live up to the plans and specifications. No contractor should be expected to give any more than is called for by the plans and specifications. Some contractors estimate low in the expectation of being able to get by with something inferior to what is called for. All men are human, and most are careless, and for these reasons it is essential to have as much inspection on a job as is necessary to see that the intent of the plans and specifications is carried out.

"This work of inspection and of interpretation of plans and specifications should be done with the exercise of a good deal of judgment, with a mind open to the interests of both the owner and contractor, with clearness and firmness. In many cases where claims are made by the contractors it is due to the fact that they are not familiar with the plans and specifications. In many cases, however, there may be a conflict or a chance of more than one interpretation to be put on them. In the decision of all of these questions the engineer should assume a judicial attitude and render his decision with fairness to all parties interested. His decision may not be satisfactory to either party, but it must be clear in his own mind that he has done the right thing to all.

"No one can see more clearly than he all sides of these questions and reach a proper decision. Sometimes that decision may not reflect any credit upon his own work, but it should be met fearlessly, if the fault lies in the preparation of the plans and specifications.

"Care should be exercised in the preparation of specifications, so that they will describe the class of work and grade of materials which are intended and expected, with clearness and conciseness. A better class of work should not be called for than is required for a particular purpose, nor should it be called for with the idea that something inferior will be obtained, which will pass. Just what is desired should be called for in the specifications and demanded by the inspector on the work.

"The attitude of the inspector, or better, the resident engineer, should be one of assistance rather than of criticism."

Endurance Tests for Roads

Endurance tests on specimen roads have recently been conducted at the National Physical Laboratory of Great Britain. In these tests the specimen road is laid in the form of a circular track 2 ft. 6 in. wide, with a mean diameter of 34 ft. The wearing qualities of the centre 2 ft. of this track are tested by 8 steel wheels 36 in. in diameter, placed at an angular distance of 45 deg. from each other and rotated by individual 2 h.p. electric motors, mounted on a steel arm which revolves around the centre post. The radial distribution of the wheels is such that the whole width of 2 ft. is covered in one revolution of the arms, and as a further precaution to ensure uniform wear each wheel is moved backwards and forwards radially by a cam mechanism through a distance of 1 in. The 8 arms are all hinged to a rotating boss on the centre post and at their outer ends are connected by spiral springs to 8 corresponding cantilevers rigidly fixed to a second rotating boss, connected with the former, and immediately below it. By means of a regulating wheel on each spring the pressure of each wheel on the track can be adjusted to any desired value up to 1 ton. According to notes given in the "Surveyor," it is estimated that, in the case of a road of tar macadam, by the use of solid steel wheels running at ten miles per hour, twenty-four hours continuous running is approximately equivalent to one year's wear on a typical heavily trafficked road. The machine is likewise applicable for use in endurance tests of wear produced by rubber tired vehicles at speeds up to 25 miles per hour.

Winnipeg is feeling a measure of gratification at a building total of more than $3,000,000 for the first quarter of 1912, and there is every prospect that the present year will see new records established. There is great activity in all sections of the city.

Impressions of a Canadian City Engineer

A Brief Consideration of the City Engineer's Status and the General Conditions Surrounding his Work

Editor Contract Record and Engineering Review:

WHEN the world at large speaks of professional men, there arises before the mind a century-long procession; of doctors, who have alleviated the sufferings of mankind since time immemorial—and occasionally put a fallen brother into a premature grave on account of his naturally weak constitution; of lawyers, who have spread light over the darkness of ages, solved legal mysteries—and perchance at times hung the wrong man; of divines, who have saved immortal souls in countless numbers—and damned quite a number of good fellows; and of learned professors, proverbially so absent-minded that they would forget to attend their own funerals. To the popular mind the civil engineer is not a "professional man." He is not commanding the respect to-day to which he is entitled. What is the reason? In a large measure it is the engineer's own fault. He lacks the general education, the knowledge of the world, the interest in the liberal arts. Only too often he is lacking in manners, though he may be very competent as an engineer. And what is the result? He takes a back seat in the community, when he should be a leader. Without wishing to disparage the other professions, I contend that the civil engineer's profession is the grandest of them all, and that we engineers should carry our heads high, be proud of our calling and be leaders instead of the tools of other men.

Engineers Should Strive to Higher Attainment

Let us consider some of the branches of our profession. The railroad engineer locates and constructs the line, undergoes all kinds of hardships and works day and night for a miserable salary, but when it comes to operating the road he takes a back seat and surrenders the leadership to the Superintendent without the technical training. The Resident Engineer is a mere figure-head and the Division Engineer is number two, with the Superintendent as number one. Who indicates the policy of our great transcontinental railroads? Not the engineers! Whoever heard of an engineer rising to become general manager or president of a railroad? But we often hear of clerks, office boys and conductors reaching the highest offices in the management. These men deserve great credit for being able to attain and fill such positions, but the engineer should aim to control the management; he should fit himself for this task which he with technical knowledge should be able to carry out better than any other man. Before this can be accomplished, however, we must cultivate amongst ourselves a more loyal spirit of professional brotherhood; we older men must back up the younger ones and lead them onward to the foremost places in the affairs of men. We should profit by the lesson which the skilled mechanics teach us, viz., that "In Union there is Strength." If all civil engineers would take this lesson to heart, we should not now be face to face with the sad fact that probably 90 per cent. of the profession is underpaid, working for such small salaries that they cannot afford to take their proper position in the community.

The municipal engineer holds the most important office in a community, when he is the City Engineer. He controls the expenditure of large amounts of money with which he is to secure the material welfare and health of his fellow-citizens. A city can better afford to have an inefficient mayor and incompetent councilmen than to have an incompetent city engineer. But how many people understand this? A city engineer is generally the target for all the abuse and slander, that can be heaped upon him by the ratepayers. Practically every City Engineer takes a back seat and allows himself to be dictated to by ignorant and conceited aldermen who only too often imagine that the fact of being elected to their office is enough to make them fully fledged engineers. They mean well generally, try hard and fail much—and then blame the poor, patient engineer. There is hardly a City Engineer in the whole of Canada who is sincerely contented with his position. That being so, how can he throw his whole soul into his work and accomplish the tasks which the tremendous development of this country places before him?

Responsibility with the Engineer

There is something radically wrong about this condition of affairs. Where shall we seek the cause and place the blame? I assert again that the engineer is largely responsible for his troubles. We must first educate ourselves properly to fill our important position, not only technically, but in a general and social way. It is not enough to-day to be a competent engineer, able to design all kinds of structures. These problems interest only a limited number of citizens and call forth little or no comment, except when some mistake occurs. We must become more men of the world, take an interest in the social and political problems of the day and be able and ready to let our voices be heard in the councils of our fellow-citizens. We all look upon our doctor as almost a member of the family; our minister is looked up to as the friend and helper in our troubles and sorrows. We municipal engineers should strive to gain similar esteem and respect. The citizens should look up to us as their leaders in public life; as their doctors, who cure the municipal ills; and as their ministers, who alleviate their civic troubles and pave the pathway of life for them, making it smooth and clean, but not slippery.

City Engineer not an Expert

Of the most important things to teach the public, one is that the City Engineer's duties are so manifold that he must not be expected to be an expert in any branch. He must have a fair knowledge of so many branches of civil engineering, in addition to business and legal knowledge, that he cannot find time to study any one subject very thoroughly. Therefore it should become more general for the City Engineer to be allowed to call in consulting engineers to help him solve any of the more important problems with which he is confronted. Doctors and lawyers do not hesitate to call in their colleagues when the urgency of the case demands it, and their clients do not think any the less of them on such account. Why then should we municipal engineers not follow the example of the other professions? It is no exaggeration that more than half of a city engineer's time is taken up with problems and questions of a business and legal nature. He must understand accounting and financial conditions just as much as he understands the technical part; and he must have a thorough training as a diplomat or he will not hold his position for any length of time. An infinite amount of tact and diplomacy is required in dealing with the public and with members of council who in the short term of one year are expected to grasp so many intricate problems. If we engineers can gradually bring these men to understand that we are in office to help and advise them, and not to fight and quarrel with them, our municipal life will become less stormy. The remedy for many of the ills that beset a City Engineer may be found in united effort to elevate the standard of the profession to such a degree of excellency that the name, Civil Engineer, shall become synonymous with gentleman. And a true gentleman is the noblest work of God.

Yours sincerely
J. Antonisen,
City Engineer of Moose Jaw, Sask.

Furnishing Quantities

Montreal, April 20, 1912

Editor Contract Record:

The furnishing of quantities in connection with a building, to my mind, means nothing. Mere quantities of material in no way represent the value of this material when in place on the building. No matter how good a description is given in the list of quantities, it is impossible to judge the value of these quantities as well as by being able to examine the plans, which show under what conditions the material is to be used. To emphasize the point, I might say that one glance at a picture will convey to a person's mind more than probably half an hour's reading, and then much more accurately than any written description. In what few cases we have tendered on jobs where the quantities have been furnished, we have been asked to pay from two to two and one-half per cent. of the amount of the contract for the quantities, and in no case have we yet found a quantity surveyor who was willing to be responsible for any mistakes he might have made by omitting any quantities of material. When this question was brought up, we were advised to examine the plans for ourselves. With men who are not prepared to back up a serious mistake, the tendency is to figure on the safe side; and when there is a question where plans are not perfectly complete or distinct, the quantities are increased to cover any point where the quantity surveyor is not sure of just what he is doing. I do not consider the plan a fair one to the owners in general, as there is no reason whatever why they should pay for the quantities being taken off. The amount of work involved in taking off quantities is really not worth considering, and the conditions are the same for all. On the argument in favor of a quantity surveyor there might be based the principle of having a co-operative bookkeeper or bookkeepers for half a dozen firms. I believe in letting each man stand on his own ability to make a living at the business he is in. I consider it particularly unsafe to take quantities from outsiders—no matter how accurate they may be.

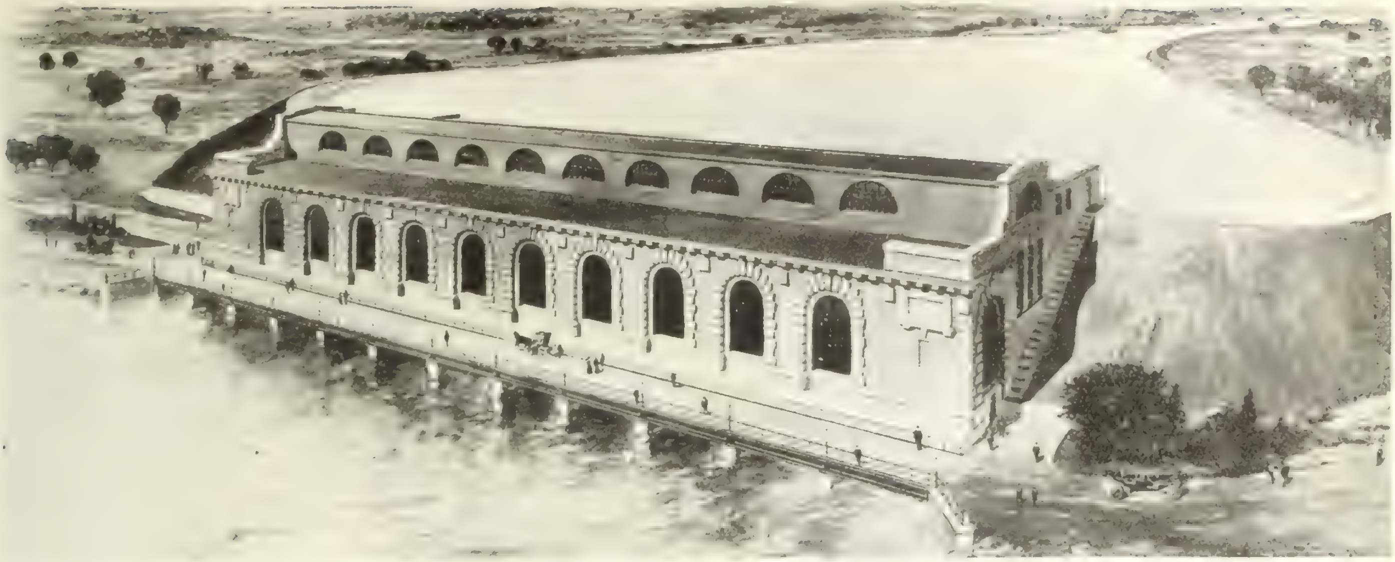
While I understand that the custom of selling quantities is adhered to in the Old Country, I also believe that the building business is done in an entirely different way. Such a person as a general contractor is little known. While I still admit that it is useful in some cases to award trades to individual men, there comes up, to offset this, the responsibility of one man handling an entire building—a man who agrees to carry out the work for a certain sum and in a certain time. The building is then turned over to the owner, who is relieved of the possibility of any trouble arising in the different trades. It is not easy to draw a definite line where one trade leaves off and the other begins. This is usually the cause of dispute where buildings are handled on a separate trade basis. It goes without saying that the best man to handle the situation is one who is used to taking the general contract for the entire structure.

I do not think that the quantity surveying system is in use anywhere in the United States,—and for rapid, fast and economical building, I do not know of any other country that can show such a record. Your theory of money being wasted because after a tender is submitted you are not fortunate enough to be awarded the contract, I consider entirely erroneous. Then again, I do not think any responsible firm wants to deal with any figures excepting those taken off by the heads of the firm or their employees. I consider the system absolutely useless and unnecessary on the present basis. The only way in which it could possibly be made of any value would be by having more concerns of enough capital and backing to stand for the mistakes made.

Yours truly,
C. E. DEAKIN

Comparative estimates on cost of a reinforced concrete 10-storey warehouse, 580 feet long and 109 feet wide, were recently made by Lockwood Greene & Company from designs using beam and girder construction and the system of flat slabs. The cost, which was based on material required for a unit strip of the building 19 feet 3 inches wide, amounted to $12,616 for the beam and girder design and $12,432 for the flat slab system. These values, which are independent of such items as plant or tools, which would be common to both methods, show a saving of $184 per unit or $5,520 for a building of that size by the use of the flat slab design.

The manufacture of building stone from blast furnace slag is an industry which is now assuming considerable importance in Germany. The process is not patented, and is very simple in details. Practically all blast furnace slag is suitable for stone making, but it must be in a granulated state. After it has been allowed to harden it is unsuitable. All attempts to utilize slag that has been crushed or ground, after having once hardened, have failed to produce a good solid stone. The slag is granulated by the addition of water as it flows hot from the furnace. The granulated slag after being thoroughly mixed with the required proportion of lime is allowed to stand one hour before being put through the press. After being pressed the stones are stacked in the open air, and, after three or four weeks, according to the weather, they are ready for use. Under low temperature they harden slowly. If subjected to frost before thoroughly hardened they are crumbled and destroyed. Operations may, however, be continued in the winter, the stones being hardened in steam-heated drying rooms. These stones grow constantly harder with time.



Bird's eye view of power house, forebay and tailrace— Canadian Light & Power Company's development, St. Timothee, Que.

Water Power from the Beauharnois Canal

A 72,000-Horse-Power Hydro-electric Development Utilizing an Abandoned Ship Canal around Rapids on the St. Lawrence River

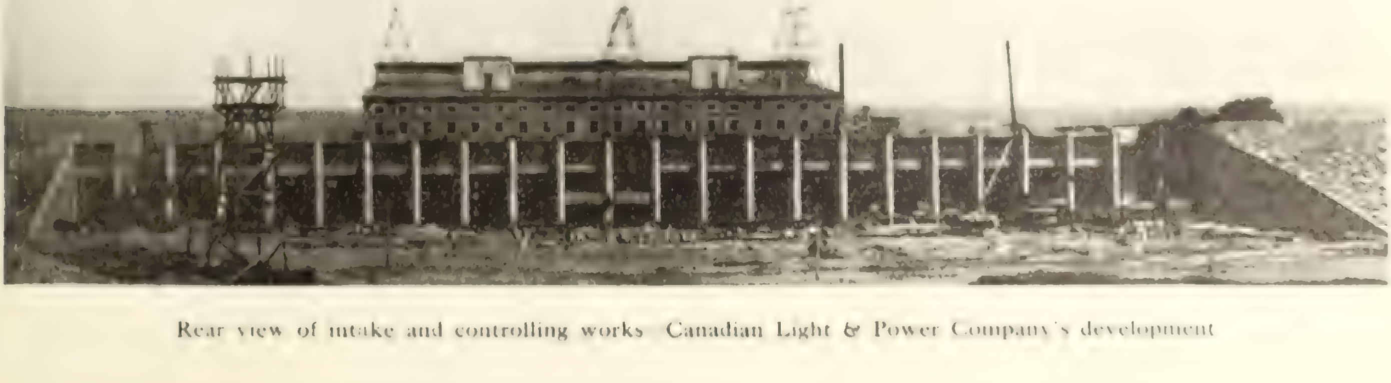
A hydroelectric plant has recently been put in service at St. Timothee, Que., which supplies light and power to the city of Montreal and vicinity. The plant is located about 27 miles west of Montreal on the Beauharnois Canal, the power rights of which have been leased from the Dominion Government. The canal has been enlarged, suitable head works constructed at its intake and a forebay 36 acres in area and of an average depth of 30 ft. has been provided. On the river side of the forebay a head wall has been constructed in conjunction with a power house and a spillway which is arranged to provide for passing drift wood and ice into the St. Lawrence River.

The present power house provides for a total capacity of 30,000 h.p. when the four units are in use. Two of these were put in service on Sept. 1, 1911, a third on Dec. 1, and the fourth is to be installed in the near future. The ultimate capacity of 72,000 h.p. will be developed later when the canal has been further enlarged. The power house has been arranged so that it can be readily extended by additions to both ends of the structure. The racks, gates and thimbles for the additional units have been built in with the head wall to facilitate the extension. The power house is located approximately 2 miles north of the New York Central Railroad, and over this stretch the company has constructed a spur line so that materials and equipment can be brought direct to the site by rail.

Canal

The Beauharnois Canal is located on the south bank of the St. Lawrence River and was constructed about sixty years ago by the Dominion Government. It has a total length of about 11¼ miles, a bottom width of 80 ft. and a depth of 10 ft. The side slopes are 1 on 2, and the depth of water over the miter sills is 9 ft. This canal enables light draft vessels to navigate between Lake St. Louis and Lake St. Francis, both of which are enlargements in the St. Lawrence River, and to overcome a difference of level between the lakes of about 82 ft. The point chosen for the power house site is about 6 miles east of the intake, and for this distance the canal was deepened and the banks raised and riprapped. It was also necessary to provide for navigation by building a boat gate at the intake of the canal in place of the former guard lock.

Upon the opening of the Soulanges Canal in 1900, which parallels the Beauharnois Canal along the opposite side of the river and gives a draft of 14 ft., the

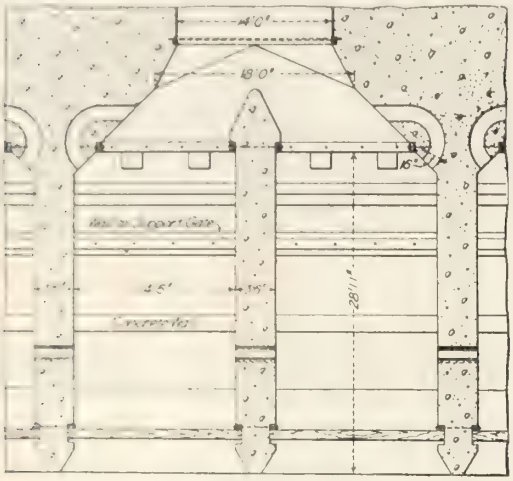


Rear view of intake and controlling works Canadian Light & Power Company's development latter canal gradually fell into disuse until at the present time it is practically abandoned as far as navigation is concerned. The Beauharnois Canal takes its water from Lake St. Francis, which has an area of 70 square miles. The tributary water shed is greater than that supplying the Great Lakes and amounts to about 300,000 square miles. At the present time the canal has a discharge of approximately 3750 sec. ft. at a velocity of 2.5 ft. per second. The net available head at the power house is 48 ft.

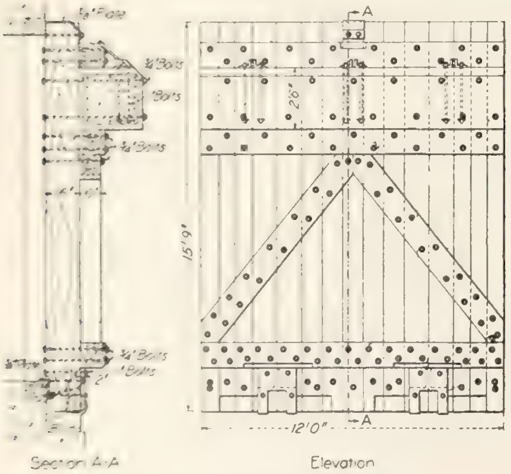
At the intake from Lake St. Francis a cofferdam was built in order to drain the canal during excavation and construction of headworks and boat gate. Great difficulty was experienced, however, in keeping the work unwatered because there was a very heavy leakage through fissures in the limestone, which lies 10 to 20 ft. beneath the surface. The head works are of heavy concrete construction and the gates are of the Tainter type operated by a travelling hoist.

Forebay

It was decided to build the power house on the bank of the river about 2000 ft. from the canal and instead of putting in penstocks of this length an open forebay was constructed by inclosing a comparatively



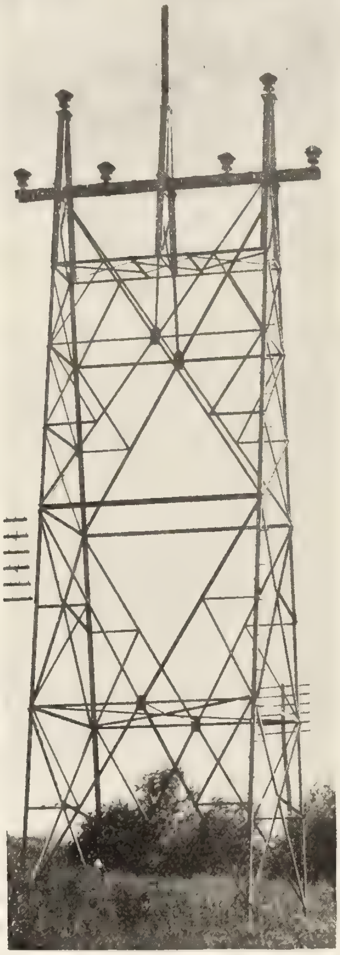
Plan of penstock entrance

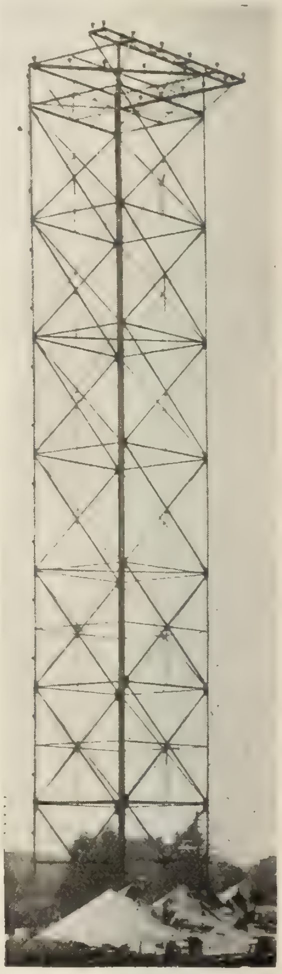


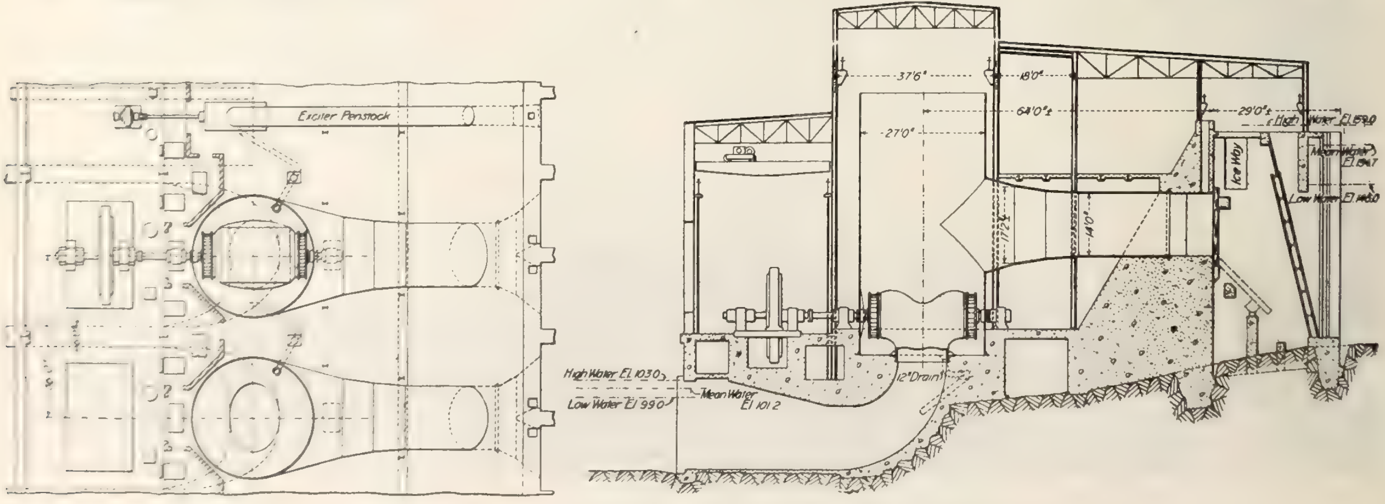
Section A-A

Elevation

Details of the penstock gates


Typical transmission tower


Special tower, crossing the Lachine Canal



Plan and section of power house, surge chamber and intake level tract of land with earth and rock embankments. These embankments are 760 ft. apart with an average height of 30 ft., and are built in three sections, outside section of earth and boulders, middle section of gravel and clay and inside section of clay. Both outside and inside slopes are 1 on 2, the inside being paved to a thickness of from 2 to 4 ft. These embankments contain 440,000 cu. yd. of earth and were constructed by dumping from trestles. The clay section was compacted by rolling the layers with 10-ton grooved steam rollers, wetting down the different layers before rolling. The other sections were compacted with streams of water using fire hose and 1-in. nozzles.

The head wall, built of cyclopean concrete and extending along the river edge of the forebay is 430 ft. long, 50 ft. high, and has a base width of 82 ft. At each end the structure is connected to the embankment by large abutments. Between the intake piers are penstock bays provided with stop log grooves on the upstream side of the racks, as well as timber gates for closing off the intake to the penstocks. The spillway is built into one end of the head wall and has a crest specially shaped to facilitate the passage of ice and drift. The spillway has a length of 32 ft. and is provided with hoists for operating the gates and stop logs.

The penstock gates are built up of timbers 16 in. thick, having 8, 10 and 12-in. widths, and are provided with concrete counter weights. On either side of these gates are by-passes built into the concrete of the head wall to equalize the pressure and facilitate opening the main gates. As the steel racks and supports were erected before the gates were built, each gate had to be assembled inside its own penstock bay. The timbers for the gates were passed into the chambers separately and the gates were built with their outer faces up and hinged edges away from the head wall. In this position it was easy to hoist the completed gate into the closed position and connect the hinges. A view of the completed gates in place is shown in one of the illustrations.

The concrete was placed in the lower section of the head wall by means of trestles and dump cars and in the upper section with dump buckets and travelling derricks, filled buckets being conveyed to the work on trucks over the trestles which were shifted as the work progressed. The concrete mixing plant was situated at one end of the head wall.

Tainter gates, canal intake and controlling works

Ice troubles may be expected in all rapid running streams in the vicinity of Montreal, it is said, but the conditions at the head of the canal are such that frazil and anchor ice have given little trouble. The canal freezes over completely, of course, but the reduced carrying capacity has been provided for by deepening the channel and when ice breaks up on the canal and forebay in the spring the intention is to dispose of it through the old canal beyond the entrance to the forebay and over the spillway. In order to take care of the ice which forms inside the penstock bays, the intake piers have been provided with a by-pass 5 ft. wide and 12 ft. deep, so that the ice in each penstock bay can be broken up and passed along the head wall to the spillway.

Intakes before placing trash racks

Penstocks, Power House and Machines

The penstocks for the main units are of riveted steel, 14 ft. in diameter, and are built into the head wall in such a way as to connect the penstock bays in a horizontal line with the wheel chambers or tanks, the distance from intake to tank being 64 ft. The wheel chambers or tanks containing the main units are made up of riveted steel plates built in the concrete floor and carried [illegible] 50 ft. above it, the diameter being 27 ft. These chambers are open at the top. The distance from the center of the wheel shaft to the top of the chamber is 49 ft. These tanks are designed to provide for the maximum fluctuation of the water surface in the wheel chamber when the full load is removed from the generator in 2 seconds.

The power house is built of concrete and divided into four sections. The front or down-stream section contains the generator room and control apparatus. The section directly back of this contains wheel chambers and tanks, the section immediately in front of the head wall provides for the transformer and line feeder apparatus, while the section directly over the head wall and penstock bays contains the gate control apparatus; the head wall forms the upstream face of the power house. Each section is provided with cranes of capacities suited to the weight of the apparatus installed.

The power house is now 136 ft. wide and 180 ft. long, these dimensions affording room for four units. The ends of the power house are walls of plastered Hy-Rib, which will be removed when the space for tht ultimate capacity of ten units is provided. The sub-structure is built of heavy concrete placed on the rock bottom of a bay of the St. Lawrence River. This bay was unwatered for construction work by a cofferdam cutting off communication with the main channel of the river. Directly in front of the power house and spanning the tail race is a steel highway bridge built on the continuations of the draft tube dividing walls. This is to provide for the Kings Highway which previously crossed the power house site.

Three main units made by the S. Morgan Smith Company are now in operation. These are of the double horizontal wicket gate type, having 72-in. runners and a rating of 5760 h.p. The maximum load is 7200 h.p. under a 48-ft. head and at 150 r.p.m. Both wheels and casings are made extra heavy. The water wheels rest directly over concrete draft tubes and span the surge chambers parallel with the penstocks. The center of the rotor shaft is 19 ft. below the penstock center line. The water wheels are direct-connected to 5000 kv.a. generators which produce current at 2300 volts. Three oil-insulated water-cooled transformers of the same capacity step up the voltage to 44,000 for transmission.

Two exciter water wheels are installed which furnish 360 h.p. normal load and 460 h.p. at maximum load at a speed of 500 r.p.m. These wheels are connected to two 250 kw. compound wound exciters. The governors for the main and the exciter units are of the oil-pressure type and were supplied by the Lombard Governor Company. The electrical apparatus was supplied by the Allis-Chalmers-Bullock Company, Ltd., of Montreal. The draft tubes for the main units are of concrete, the section changing from oval at the turbine to rectangular at the tail race. The tail race widens from the draft tubes in the shape of a fan so that the discharge capacity for the ultimate development will be ample.

The work has been carried out for the Canadian Light & Power Company by J. G. White & Company, Inc., which firm has been in charge of the design and has supervised the work of construction.

Abrasion Tests of Brick

In studying the matter of abrasion test of paving brick in connection with the preparation of standard specifications for the American Society of Municipal Improvements and the Association for Standardizing Paving Specifications, E. H. Christ, of Grand Rapids, Mich., who was chairman of the committee on brick paving of both those socities, conducted a considerable number of experiments, using both the old style rattler and the new one recommended by the National Paving Brick Manufacturers' Association, using cube shot in the old rattler and both cube and spherical shot in the new rattler. The results of these tests are given herewith to show the difference, as indicated by these tests, between abrasion loss in the new and in the old rattler under apparently similar conditions.

In the first 102 of these tests, samples of brick as nearly the same as possible were placed nine at a time in each of the two rattlers, and 51 of such tests were made in each rattler, but with this difference, that while cube shot were used in the old rattler spherical shot were used in the new. In one pair of tests the old rattler showed a loss .1 per cent. greater than the new rattler, but in every other case the new rattler gave an average loss of 14.7 per cent., and the same number of tests with the new rattler gave an average loss of 18.1 per cent. This difference of 3.4 in the percentages of loss really amounted to an increase of about 23 per cent. in the amount of loss due to the use of the new rattler and the spherical shot.

The next 50 tests with each machine were conducted using cube shot in both rattlers, with nine brick in each test. In this case the loss in the new rattler exceeded that in the old in 29 cases, was less than that in the old in 19, and the two were identical in two cases. The average loss in the old rattler was 14.94 per cent., and in the new rattler 15.55 per cent., a difference of .61 per cent., or an actual increase in loss of weight of 4.06 per cent. The maximum difference between the two machines in any one pair of tests was an excess by the new machine of 4.0, and an excess by the old machine of 2.6.

The next ten sets of experiments were made with each set consisting of two tests of nine brick each with cube shot in the old rattler and one test with 15 brick and no shot in the new rattler. This showed about 6 per cent. more loss in the new rattler than in the old in each case except one, where the difference was about 10.5 per cent.

The last 50 sets of tests were made with cubical shot in the old rattler and spherical shot in the new, there being two tests in the old rattler of nine brick each to one in the new rattler with ten brick. These showed a percentage of loss in the old rattler averaging 15.74, and in the new rattler averaging 19.4, a difference between the two of 3.30 per cent. of loss, or a loss in the new rattler 21 per cent. greater than in the old.

The brick used in these tests were 3½ or 3¾ by 8½ or 8¾ by 3¾ or 4. The corners were rounded with radii which in some cases were three-eighths and in other five-sixteenths of an inch.

These figures are given to serve as a guide in specifying loss by the abrasion test when made with the new rattler on brick of this size. The number of kinds of brick tested and the number of tests made are not considered sufficient to cause these figures to be considered as more than tentative, to be used until more exhaustive tests can be made.

Another set of 90 tests was made to endeavor to discover what difference, if any, there is between the abrasion of bricks of different shades. Light, medium and dark bricks were tested, thirty charges of each, each charge consisting of ten bricks, given 1,800 revolutions in one hour. The mean loss of the 300 light bricks was 21.15 per cent.; that of the medium bricks, 20.39 per cent., and that of the dark bricks, 20.59 per cent. This shows a very slight advantage for medium and dark brick, but practically no difference between these two.

Loading a bridge with water was the method employed in testing for acceptance a reinforced concrete arch, supported on mass concrete abutments faced with red sandstone coursed ashlar. The structure provides an overhead railroad crossing near Fransworth, England. The bridge has three arch ribs, each with a span of 57 ft. and a rise of 8 ft. 3 in., which support the spandrel walls and decking, carrying the roadway of the structure. The Kahn system of reinforcement was used throughout and the bridge was designed for a uniform load of 250 lb. per square foot. An unusual method of testing the bridge before acceptance was employed by means of a hydraulic load. This was accomplished by building clay dams at either end of the bridge between the parapet walls and filling the enclosed space with water supplied through a 2½-in. hose. The load was thus applied in about eight hours, and it is stated that the deflection of the structure was only 1/16 in. at the center, or less than 1/10000 of the span.

G. T. P. Hotel, Edmonton

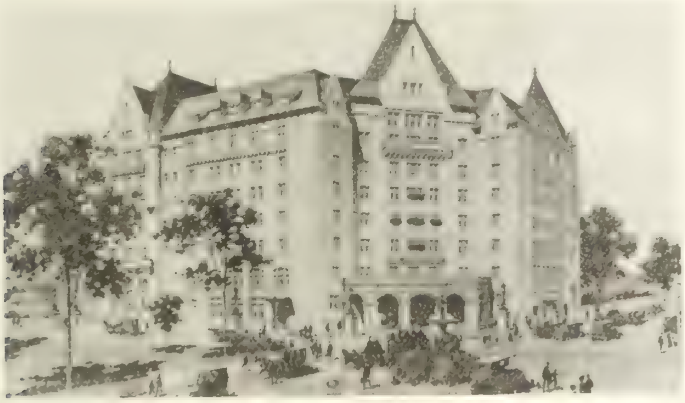
WITHIN a few weeks operations will be commenced at Edmonton, Alberta, on the second in the chain of hotels which the Grand Trunk Pacific Development Company will build in Western Canada in connection with the general scheme of the Grand Trunk Pacific Railway Company. The architects are Messrs. Ross & MacFarlane, of Montreal and Winnipeg. The site has been especially well chosen, as while giving convenient access to the business centre, it allows of a very fine outlook.

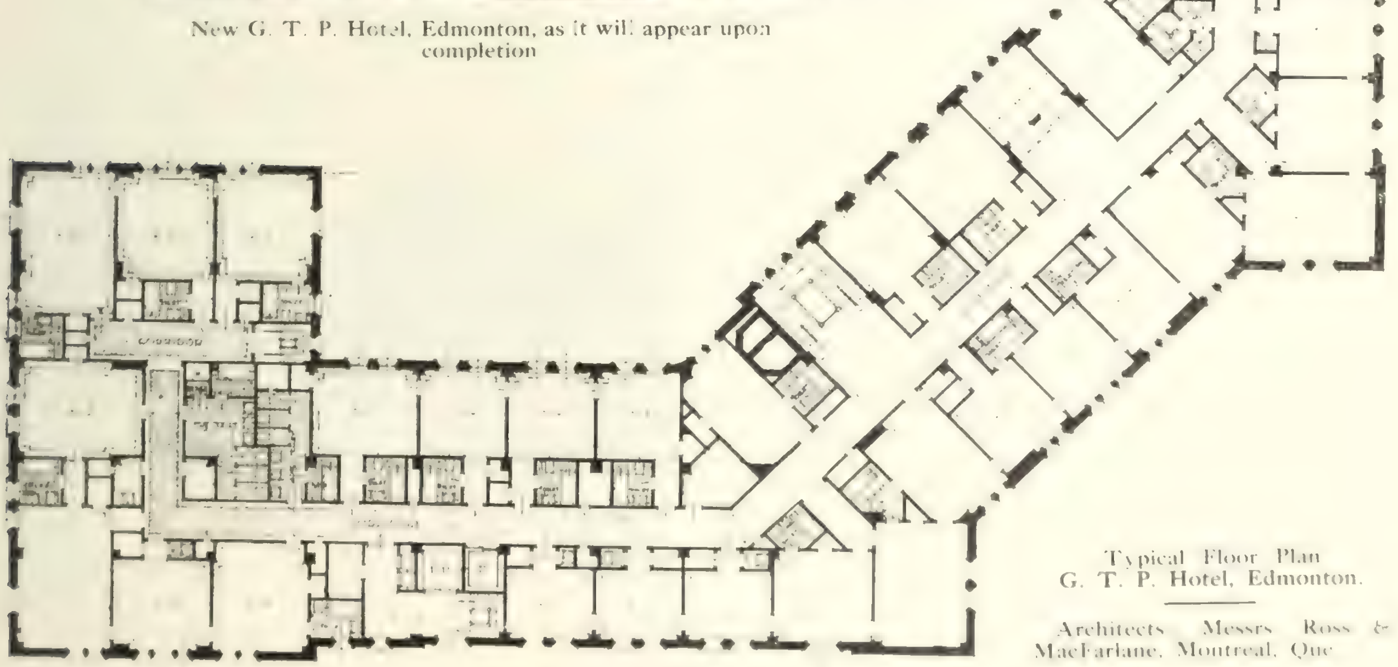
According to the plans, the main entrance will be at the corner of McDougal street and a lane, which has been widened sufficiently to provide a good outlook for the rooms along this side. In order to take full advantage of the site, and at the same time provide a more pleasing approach, the entrance has been set back some distance from the corner and is approached through a forecourt and loggia. From this loggia, access to the building can be had directly into the rotunda or for the convenience of lady patrons through a smaller entry leading to a lady's reception room and directly to the office and elevators.

From the rotunda a corridor leads right and left, the former to a large well lighted, octagonal palm room, the latter to the cafe and main dining room, while midway along this corridor on either side is the coat room and an ante-room, the latter leading to the bar, barber shop and billiard room. Directly beyond the rotunda is the lounge, lighted by a large segmental bay window from which a full view of the ravine can be had. In addition to this, a portion of the McDougal street facade is on this floor given up to two stores which have direct communication with the hotel proper and on the lane elevation a separate entrance to the bar is provided.

Between the ground floor and first bedroom floor a Mezzanine provides space for ladies' parlor and drawing room, fronting on McDougal street, while a banquet room and private dining room are situated over the ante-room and bar, the balance of this floor being in the form of galleries overlooking the rotunda, cafe, and dining room. Above this the two hundred bedrooms require five floors, making seven in all, each room having a private bathroom arranged so that the room may be rented singly or en suite.

Architecturally, the building is distinctly of the Chateau type, modified to suit its purpose as a modern hotel. The exterior will be entirely of stone and fireproof throughout, the frame being of steel, skeleton type, with floors of reinforced concrete and interior partitions of terra cotta. The mechanical equipment includes three electric passenger elevators, one electric freight hoist, and two electric dumb waiters running throughout the entire height, together with the most modern heating and ventilating system. The interior decorations and furnishings will be in keeping with the rest of the building, and the hotel promises to be one of the finest structures in the city.


New G. T. P. Hotel, Edmonton, as it will appear upon completion


Typical Floor Plan
G. T. P. Hotel, Edmonton.

Architects Messrs Ross & MacFarlane, Montreal, Que

Municipal Improvement at St. Lambert, Que.

Contributed by A. S. Dickison, Town Engineer

THE Town of St. Lambert, Que., has a population of about four thousand people. In February, 1911, the citizens voted a loan of $225,000 for the making of sidewalks, streets, sewers, etc., under the supervision of a civil engineer directed by a works committee—appointed by the council.

The Engineer went to work on May 1st, 1911, and on May 27th signed a contract to do all the engineering work on the improvements under the loan by-law on a basis of four per cent. On May 29th tenders were opened for road roller, stone crushing outfit, sidewalks, pavements and supply of materials, but the contractors failed to submit tenders on the sewers or road grading. Since this was essential before any work could be done, the Works Committee induced the Engineer to undertake the sewer work himself, and as it was not in his contract as engineer, arrangements were made to give him extra remuneration for doing this work on a percentage basis of the estimated cost. The underlying material is Utica shale and very hard; the pipes were large and the cost was estimated at two dollars per running foot for the labor only. The town council approved of the arrangements and appointed an outside inspector over this portion of the work and the job was at once opened up. Within fifteen days an injunction was served on the town, and the engineer put a stop to the work because of the complaint that the plaintiff would be ruined thereby, when, as the fact developed the plaintiff was not even a property owner. The case was thrown out of Court, but was as promptly renewed in another form. In spite of this, however, the work progressed rapidly. About the end of June another injunction was placed on the work, this time by the town of Longueuil, on account of the pollution of the drinking water, by sewage being dumped into the St. Lawrence River above the intake pipe of the latter town.

1—A street at St. Lambert, Que., before the commencement of road improvement

2—Street at St. Lambert, Que., sewer laid, grading done and stone drainage bed put down

This necessitated a change in the sewage system. Since the old sewers were found insufficient and sometimes out of repair, the new storm sewers were placed low enough to take all the sewage, and a plan was started for a new disposal system. During the season there was put down at an average depth of 8 ft. 6 in. the following vitrified sewer pipes: about 2,400 lineal ft. of 18-in. pipe, including junctions; about 2,300 lin. ft. of 15-in. pipe, including junctions; about 3,400 lin. ft. of 12-in. pipe, including junctions; about 960 lin. ft. of 9-in. pipe to catch basins; about 3,800 lin. ft. of 6-in. house connection pipes. The cost of laying this amount of pipe for labor only was for the 18-in., 15-in., 12-in. and 9-in. pipes, $18,300, and for the 6-in. pipes about $6,000; but this amount covered the laying of ⅝-in. lead pipe in every trench of 18 ft. length.

The Engineer doing the work after his own designs had to supply the office staff and superintendent, and otherwise do all the work a contractor would have to do, but was carefully watched at all times by a competent inspector of the town.

The sidewalk contractor laying a 6¼-in. combined sidewalk, curb and gutter on a stone bed prepared by the town, received $1.31 per lineal foot for this work. The sidewalk was 4½ feet wide with 18-inch gutter and 8-inch curb. He began late in the season on account of the litigation carried on by the citizens against the engineer and the town, but succeeded in getting down about 5,800 lineal feet of finished work.

3—Sidewalk construction in progress at St. Lambert, Que.

The grading of the roads, which meant removing about 15 inches of material therefrom, was carried on by the engineer, operating under similar conditions as to the sewers. Of this work there was 8,400 lineal feet, 36 feet wide, and the stone bed prepared for the contractors. At this writing the town has refused to pay for the work done by the engineer on the plea that the council cannot agree as to the amount.

All the stone for the entire job had to be supplied by the town, and stone is a scarce article in St. Lambert.

The paving contractors got about 6,000 yards of 5-inch concrete bed put down when frost overtook them. The price of this work is $1.83 per square yard with 2½-in. of Bermudez Lake asphalt surface and $2.23 per square yard of bitulithic on 5-inch bed. About $8,700 worth of vitrified sewer pipe was purchased, together with $9,800 worth of reinforced concrete sewer pipe, 30-in. and 39-in. in diameter. During the winter a contract for 2,700 feet of main sewer 39-in. and 30-in. was let, and is now nearing completion.

A machinery plant costing about $5,500 was purchased for the town and was made good use of during the work. The entire expenditure during the season amounted to $135,000, including the purchase of 10,000 tons of stone for the contractors, which is, of course, charged against the paving contracts. A new sewer outfall, meeting the requirements of the Provincial Board of Health has been designed, and a by-law loan is being arranged to procure the necessary funds to carry out the work.

4. The completed sidewalks

In the photographs reproduced herewith there is shown: in No. 1, the condition of the street as it appeared before the work was commenced; in 2, a street after the sewer had been laid, the grading done and the stone drainage bed put down; in 3, the workmen laying sidewalk; in 4, the finished sidewalk; in 5, the work being carried on laying the 39-in. lock joint reinforced concrete pipe. Sidewalks were laid by using Hotchkiss steel forms and the blocks are cut clean through every six feet. Frost seems to have no effect on them. A form of catch basin designed to keep it from freezing is used, and during the winter none of them have frozen up. The water in the bottom is kept charged with sulphide gas from the sewer, being sealed 2-in. deep. The seal is cast directly in the body of the basin. The drainage bed is very efficient, being able to cope with any rainfall through the 4-inch tile under the curb.

In all the streets the standard width of roadway is 26 feet and the sidewalk 4½ feet. This leaves a wide boulevard outside the sidewalk to the street line which will be kept in order by the owners. These improvements are assessed directly against the owners to the extent of 75 per cent. over a period of forty years.

Tar for Road Work

A bulletin has been issued by Prevost Hubbard, chemist of the Office of Public Roads of the United States Department of Agriculture, in which he discusses, with figures and analyses, the production in this country of tars, with a special view to their use in road construction. In this bulletin he especially considers the manufacture of coke oven tars and the desirability of extending their production. Mr. Hubbard gives figures showing that in 1908 330 million gallons of tar were lost which might have been saved if by-product ovens had been used, or three times as much as the amount of tar actually produced. "At a conservative estimate the tar lost each year from non-recovery coke ovens is sufficient to build 9,000 miles of tar macadam road 15 feet wide." Other figures appear to indicate that in 1910 530 million gallons of tar were lost in this way, while in that year 66,303,214 gallons were obtained from by-product coke ovens. In 1910 there were known to be 31 manufacturers of coke oven tars in the United States and Canada.

"Straight coal tar road binders or refined coal tars are usually manufactured by subjecting the crude material to a process of distillation with or without steam or air agitation. Distillation is carried to the point at which the residuum remaining in the still has obtained the desired consistency at normal temperatures, and this involves the removal of certain of the more volatile oils present in the crude material. For use in construction work a soft and almost fluid pitch is often produced, and the consistency of this pitch is controlled by means of a melt

5.—The 39-inch lock joint reinforced concrete pipe used at St. Lambert

ing point of that test. When the crude tar runs abnormally high in free carbon, it is sometimes mixed with crude water-gas tar before distillation. Water-gas tar contains a very low percentage of free carbon, and by properly proportioning the two a product is obtained upon distillation, which does not carry more than the maximum limit of free carbon set by manufacturers. What the maximum limit should be is a much mooted question among those who have given thought to this matter. The governing considerations are: (1) What is the most economical limit from the standpoint of manufacture? and (2) What is the proper limit with regard to the utilization of the product as a road material? For a number of reasons, which it is unnecessary to mention at this time, an excessively high-carbon tar is difficult to distill properly and, with other things equal, the lower the percentage of carbon the easier and shorter the distilling process. From this standpoint, therefore, by-product coke-oven tars are well adapted to the manufacture of road binders. Moreover, because of their low percentage of free carbon, they may be employed in a manner similar to water-gas tars, when it is desired to utilize a crude high-carbon tar in the production of a medium-carbon tar road binder.

"In an ordinary road tar for use in construction work where free carbon is present to the extent of about 20 per cent., the proportion of total distillate, below 315 degrees C., to pitch residue is approximately 1 to 4. Where this relation exists the pitch residue is hard and brittle. A residue which is soft or plastic is to be preferred, as it would indicate longer life during service, and where such a residue is present the proportion of distillate would naturally be lower for a given consistency, as the distillates may be considered as fluxes for the residues. If such is the case, coke-oven tars offer a valuable source of supply for tar road binders. Even the highest-carbon tar, if distilled to the point where the proportion of distillate, below 315 degrees C., to the pitch residue was as 1 to 4, would contain less than 19 per cent. of free carbon, which is at present considered as not excessive for a refined coal tar.

"In conclusion it may be said that indications point strongly to the fact that by-product coke ovens will eventually play a most important part in the road material industry, and it is to be hoped that their general adoption in this country will be rapid. The future demand for economical bituminous road binders in the United States will undoubtedly exceed the supply, and this in spite of the natural increase in petroleum and asphalt road binders. If such is the case, the present loss of enormous quantities of tar, to say nothing of gas and ammonia, because of the use of beehive ovens, is a matter worthy of the utmost consideration on the part of all who are interested in the conservation of our resources."

Prepared Filler Method of Constructing Bituminous Macadam

The following description of the above method is taken from a bulletin of the United States Office of Public Roads, prepared by Charles H. Hoyt, Superintendent of Construction:

The actual construction is carried out very much the same as the plain water-bound macadam is built; that is, the foundation course is exactly the same as for a plain macadam. Then the top-course stone, varying in sizes from ¾ in. to 2 ins., is spread evenly to a depth of 3 or 4 ins., as may be specified for the depth of the top course while loose. The next step, and while the top-course stones are still loose, is to apply a layer of prepared filler spread evenly over them to a thickness equal to about four-tenths to five-tenths the depth of the layer of loose stone.

The prepared filler is made in the following way: To 1 volume of stone chips or pea gravel, varying in sizes from ⅛ to ¾ in., are added about 40 per cent. by volume of clean, sharp sand and from 10 to 15 per cent. (by volume of the stone chips or gravel) of bituminous binder, which may be of any kind or quality that would be used by the penetration or mixing methods, although it would probably be of no advantage to use by this method the lightest grades of those binders that are specified for the penetration method. The stone chips or pea gravel, sand, and bituminous binder are heated or not as may be required to secure a uniform mixture, and then they are thoroughly mixed together either on a board with shovels or in a machine mixer. After the layer of prepared filler has been spread over the top course of stone, it is then worked down into that course with rakes, or by harrowing with a light steel spike-toothed harrow the teeth of which are about ½ in. square, set close together, and about 3 ins. in depth. The harrowing should continue only until the top-course stone begins to appear through the layer of the prepared filler, and then the surface is rolled with a 10-ton roller until it is firm. More of the prepared filler may be sprinkled over the surface to cover bare spots as the rolling progresses, and, if desired after the first rolling has been finished, a surface coat about ¾ in. in thickness of the prepared filler may be applied and the surface re-rolled.

Two sections of road—one 50 ft. long, the other 75 ft. long and 16 ft. wide—were built by this method under the supervision of Mr. Hoyt in September, 1910, at Ithaca, N.Y., on East Avenue, passing Cornell University campus. On the 50-ft. section, after the first rolling had been finished, a paint coat of about ½ gal. of oil asphalt per sq. yd. was applied and covered with stone chips. On the 75-ft. section a surface coat about ¾ in. thick of the prepared filler was applied as described above. An oil asphalt binder was used for the 50-ft. section and a cut-back oil asphalt was used for the 75-ft. section. These two sections are now (January, 1912) in excellent condition. By using the proportions of materials stated for the prepared filler—that is, 1 volume of the stone chips or gravel, 40 per cent. of sand, and 10 per cent of bituminous binder, there are required for a layer 1 in. thick over 1 sq. yd. of road surface the following amounts of material: 0.028 cu. yd. of chips, 0.0112 cu. yd. of sand, 0.0028 cu. yd. of bitumen, or 0.567 gal. per sq. yd. If 15 per cent. of bitumen is used, then 0.85 gal. per sq. yd. is required. Assuming that a layer 2 ins. in depth of the prepared filler is used, the 10 per cent. filler will require 1.134 gals. of bitumen per sq. yd. of road surface, and the 15 per cent. filler will require 1.7 gals. of bitumen per sq. yd. The sand is used to serve a twofold purpose, one of which is to fill a part of the voids, and the other, which is the principal reason for its use, is to control the consistency of the mixture so that it can be manipulated freely. The amount of sand required can be determined by a few trials and will vary with the kind and amount of binder used. It is better to harrow or rake the prepared filler into the top course as soon after the filler is spread as possible; however, no difficulty was experienced in harrowing in a section of the filler that had lain two hours after is was spread. Some advantages of the prepared filler method are: (1) The amount of stone that is required to be heated is about one-half or less than the amount required to be heated by the mixing method, thus reducing cost and saving time over the all-mixing method. (2) The amount of bitumen required is less than by the penetration method. The amount used can be well controlled and but very little wasted. (3) The prepared filler can be applied evenly, and when worked into the top course it fills the voids and thus makes the surface comparatively solid and durable. (4) The manipulation of the prepared filler is rapid and convenient. The heating and mixing can all be done at one place, such as the crusher site, and the prepared filler hauled to the road where it is to be applied. (5) The prepared filler can be spread practically as well as dry screenings, and thus it is an economical and practical method of applying the bituminous binder, and the results obtained are a solid and substantial road.

Pipe Systems in Streets*

By Charles E. Bolling, City Engineer, Richmond, Va.

The purpose of this paper is to call attention to pipe systems in streets in connection with roadway improvements. At this period of progression, when so many people are aroused and interested in the advancement and improvement of our country, not confined to localities, but extending over the whole of the United States; when the attention of our progressive citizens is being attracted to the many and various plans and schemes for greater development of our resources, as shown by numerous conventions and assemblies where we are enlightened by many instructive and able articles and discussions upon the different subjects for our further development, I feel confident that no one subject has more aroused the interest of the people than the importance and necessity of constructing highways, roads and streets.

Much valuable information and instruction has been freely given as to the making and maintaining of good roads and streets. It appears to the writer of this article that some important and economical features in road construction have been overlooked and have not received proper consideration. Therefore, as briefly as possible, I shall call attention to what I regard, after many years of experience, as being in the line of economy in road construction and maintenance, which is, as the title of this paper shows, the necessity of underground pipe construction before making streets and roads. Especially do I regard it as being worthy of consideration in growing cities, towns and suburban sections. No matter how carefully a road or street may have been built, it is destroyed and ruined subsequently by the introduction of pipes, such as sewer, gas, water, etc., and their connections, and whenever installed the results are a series of ruts and mounds in the street. I have never seen a street properly repaired after being cut up for pipes.

In communities that are improving and developing, the first cry is for good roads. Then later follows the demand for water, sewerage and light. After a while these necessary improvements are made—most often at long intervals. With each pipe construction the street is cut into, again injured, and finally has to be entirely reconstructed. It is recognized that all of these conveniences are paid for by a tax upon the property abutting the street, whether the improvements are made by the city, or town, or by a private company, and, whenever a section is sufficiently built up to demand these necessities and comforts, sewer and pipe lines are constructed and connections made to the improved or occupied lots scattered along the line of the highway. The vacant lots usually do not have the connecting pipes from the main lines extended to them. And then connections are made for sewer, gas and water, from time to time, as each lot is built upon. At least such is the custom in this city.

The writer wishes, therefore, to bring to your attention the importance of having all of these connecting pipes extended from the main pipes to the vacant lots at the time the main sewer and pipes are laid in the street. This, however, is often attended with difficulty, on account of uncertainty as to what may be the future subdivision of the lots. Generally this subdivision can be ascertained quite closely by an examination of the recorded plans and the frontage of the improved lots and the connections adjusted accordingly. Assuming that the essential underground pipe connections are sewer, water and gas, that the block or square contains a frontage of 300 ft., that the subdivision into lots averages 30 ft., and that only ten of these lots have been built upon, there will be ten vacant or unimproved lots and ten unused connections. Basing the estimate of cost of such connecting pipes on that in a street 60 ft. wide, I find the average costs of connections in this city are as follows: Sewer connection, 10 ft. deep, $12.00, gas connection pipe, 2½ ft. deep, $6.00, and water connection pipe, 2½ ft. deep, $6.00, each of the latter having the necessary stop cocks at the curb line, making a total of $24.00 for each lot. Assuming the rate of interest upon the outlay to be 4 per cent., 96 cts. would be the annual expense on this cost.

It is also the experience of the writer that in the communities where these conveniences, such as sewer, water and gas exit, the growth and improvement is rapid, and in a short time all the abutting lots are improved and occupied. Under the laws governing the city of Richmond, the cost of water and gas mains, as well as connections to same, are not charged to the abutting property, nor is the main sewer, but there is an annual sewer tax of ten cents for every foot of frontage in the street, and the cost of the sewer connection is paid by the lot owner only where the fixtures on the lot are connected, and the owner of the vacant lot does not pay for this connection to the sewer until it is used. The increased value of the abutting property, however, is so great, because of having the necessities and conveniences of sewer, gas and water, that the tax receipts are greatly in excess of the small annual interest on the cost of pipe connections. It is evident that this cost for pipe connections is warranted. In all cases where the street has already been paved or otherwise improved, the cost of making the pipe connection is at least 60 per cent. greater than in the unimproved street, and the restoration and maintenance of the paving of the street, in the end, amounts to double the original cost. Again, had these different pipes and pipe connections been constructed prior to paving the street surface, the opportunity would have been afforded for carefully treating the trenches and fills and thoroughly and properly preparing a road base.

The writer recognizes the fact that the time will never come when the streets of a city or town will not have to be cut into for repairs and various other purposes, and that to a large extent what he has brought to your attention applies to local conditions, as evidenced in his own long experience. But at the same time he feels assured that by consideration, co-operation and the construction of underground pipes prior to the surface improvement of a road or street, much money can be saved in construction, and especially in the maintenance, of both roads and streets.

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*Paper presented before the American Association for the Advancement of Science.

This paper is intended only to apply to underground pipes used for municipal service and not to pipes for road drainage, which properly belong to road construction.

Water Sterilization in Quebec

Some months ago the Provincial Board of Health of Quebec found several cases of typhoid in the districts supplied with water by the Saraguay Water and Power Company. The intake of the company's service was in the Riviere des Prairies, which is just outside Montreal, and it was believed that the water thus obtained was free from sewage. Investigation, however, showed that the supply was not good, and on the representations of the Board of Health, the company have installed a hypo-chloride of lime plant at Cartierville for sterilizing the water. The supply is treated before being distributed to the service pipes, the work having been done under the supervision of Mr. Meadows, engineer to the Board of Health. Several tests have been made since the installation and the results have proved satisfactory. The Board are endeavoring to get other municipalities along the north shore of the St. Lawrence to establish similar plants. For some time the authorities have been doing much field work in the Riviere des Prairies and the St. Lawrence north of the Island of Montreal, and it has been ascertained that the raw water there found is, in many localities, wholly unfit for consumption. This was more particularly so in the case of water found immediately opposite Ahuntsic, whilst the same condition was found near St. Genevieve, and at a point opposite St. Vincent de Paul. Sewage pollution was found to exist in practically the whole of the river, and it was a consequence of such a condition of affairs being made known to interested municipalities, that water sterilization plants were, in many cases, established.

The Oxy-Acetylene Torch in Cutting Metals

Briefly and typically stated, the procedure of cutting with an oxy-acetylene cutting torch is as follows: The metal is first highly heated by the use of the welding flame at the point where the cut is to begin. A second jet, located in the immediate vicinity of the heating nozzle, discharges a stream of oxygen upon the highly heated metal, and this results in a removal of the metal by a process which appears to be combustion in part or in whole. Moving the double nozzle along, the metal will be cut just as a handsaw will cut a board in two.

In cutting through metal, whether thick or thin, the cut is made all the way at one time. Thus, in cutting 6-inch metal, the cut is not made part of the way through upon one passage of the jets across and then finished by another passage. The cut is made just as with a handsaw. Indeed, the jets are directed downward and with the upper portion leaning in the direction of movement. The cut is thus made in a very similar manner to that made by the saw. However, the profile is perhaps steeper. Further, it is not precisely straight, but has a slight curvature.

Of course, it is the practical application of a process which interests the industrial world. At the same time it should be remembered that a knowledge of the underlying principles of the process can hardly fail to prove useful, especially where variations from established practice have to be made. It is recommended that the foregoing account be well digested.

The cutting of sheet steel is a matter which has been pretty well attended to. The practice varies somewhat in respect to the pressures to be used. However, the following may be taken as typical: If the steel is ½ inch or less in thickness, then the oxygen of the heating tip is kept at 14 to 18 pounds and of the cutting jet at 20 pounds. For heavier steel, but not thicker than 1½ inches, the two pressures are 14 to 18 and 30 pounds. For sheets thicker the pressure may be kept at 18 to 22 and 45 to 75 pounds. Where a factory has a great deal of cutting to do of a few sizes, a little experimentation should be made to determine the most economical pressures. These may very well vary with the character of the steel itself. The consumption of oxygen is, at times, an important point. It is more expensive than the acetylene and much more is used. However, when the high pressures are employed the cutting can be rather quickly performed, so that the total amount will be reduced for that reason, although increased because of the pressure.

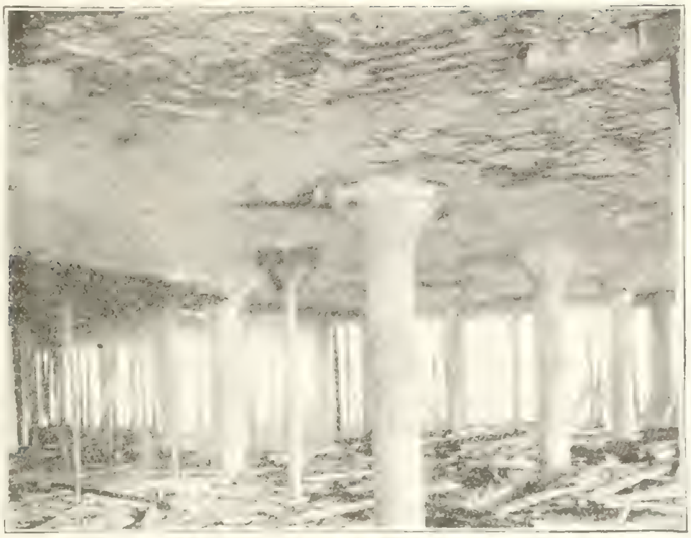
A mechanical means of cutting sheet metal has been devised. The apparatus is carried across the sheet with precision and regularity. This is probably the best way to cut sheets. Further, a device has been gotten up for the purpose of cutting steel tubes when in the vertical position.

Jacketing bridge masonry with concrete has been done to a considerable extent during the past three years on the Iowa Division of the Chicago & North Western Railway, according to a memorandum furnished by Mr. H. Rettinghouse, division engineer, to the committee on masonry of the American Railway Engineering Association. Old masonry which has deteriorated badly has been carefully cleaned, the joints cleared and all loose and weak portions of the stone removed. Hook dowel pins were then set in the masonry, expanded metal attached to them and a jacket of 10 to 14 in. of concrete applied. It is found to give perfect adhesion.

A well equipped municipal testing laboratory is now being installed in the city of St. Louis. This laboratory has been in existence for some years, but is now being increased to a marked extent. The equipment comprises a cement laboratory, a coal-testing laboratory, and a number of testing machines varying from the small briquette-testing machine to a 300,000 lb. tension and compression machine. It is intended that the purchase of all city materials shall be regulated by specification and accepted only under test by this laboratory.

The contract for the steelwork required by the India Office for the new bridge to carry the Oudh and Rohilkhand Railway over the river Jumna, near to Hamipur Station, has recently been awarded to the Phoenix Bridge Company, of Phoenixville, Pa., whose tender is understood to have been 26½ per cent. lower than that of the lowest British tender. There will be twelve spans, each 250 feet in length and weighing 315 tons.

International Harvester Company's Warehouse, Fort William, under construction



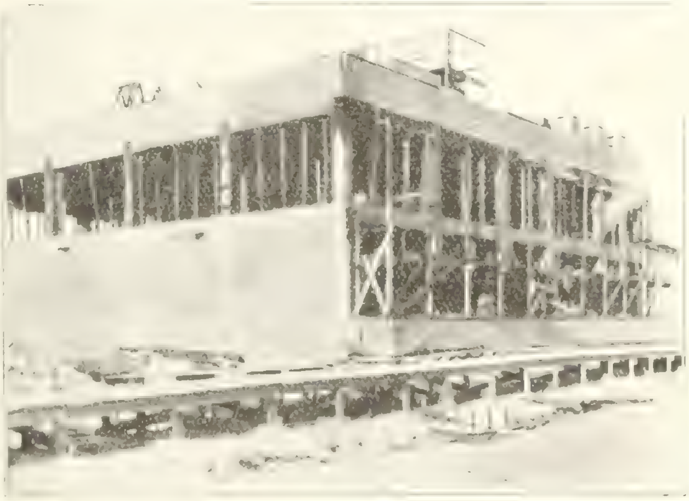
Interior of Swift Canadian Company's Building, Fort William, after fire had burned out the centering

The Mushroom System at Fort William.

A very interesting accident to a reinforced concrete building occurred at Fort William in December last. A fire in the Swift Canadian Company building completely burned out the centering of the first and second storeys. Views of the exterior and interior of the building after the fire are shown herewith.

The third floor slab and the columns supporting the same were cast on December 7th, 1911. The fire occurred on December 15th, eight days after the concrete was poured. In addition to this the concrete was cast in cold weather, this fact being the indirect cause of the accident, as salamanders were kept lighted under the slabs to keep the temperature above freezing. A pot of pitch caught fire from one of the salamanders and it took very little time for the centering to burn out under both floors.

The concrete was damaged only by a slight surface spalling and the slabs stood up under their load without any apparent crack or sag. The spalling was due to the formation of steam from the moisture in the pores of the outer portion of the concrete and was not in any way due to the fact that concrete is not able to withstand the heat when cured, but rather that it was in a partly cured condition. The short time allowed this concrete to set before the accident indicates the strength of the design, which was standard Turner Mushroom system. The J. & W. A. Elliott Company, of Minneapolis, were the contractors erecting the building and Mr. C. A. P. Turner designed the reinforced concrete work.



Exterior view of Swift Canadian Building, after fire

International Harvester Company's Warehouse, Fort William

Interior view Gowans Kent Warehouse, Winnipeg

Proposed Standards for Measurement in Concrete Construction

THE committee appointed by the National Association of Cement Users to draw up rules to be observed in the measurement of concrete volumes, submitted the following recommendations at the eighth annual convention.

The following divisions are recognized as separate and distinct items in concrete construction: 1. Concrete—(a) Monolithic; (b) structural cast concrete; (c) cast concrete trim and ornamental work; (d) sidewalks. 2. Forms. 3. Reinforcement. 4. Surface finish.—The following general rules shall govern the measurement of the above items, with exceptions where specifically noted: (a) All work shall be measured net as fixed or placed in the structure. (b) In no case shall non-existent material be measured to cover extra labor. (c) No allowance shall be made for waste, voids, or cutting.

Concrete

(a) Monolithic Concrete: The unit of measure shall be the cubic foot. All concrete shall be measured net as placed or poured in the structure or building. All openings and voids in concrete shall be deducted with the following exceptions: (a) No deduction shall be made for reinforcement bars, I-beams, bolts, etc., embedded in concrete except where they have a sectional area of more than 1 sq. ft. (b) No deduction shall be made for pipes or holes in concrete having a sectional area of less than 1 sq. ft. (c) No deduction shall be made for chamfered, beveled, or splayed angles to columns, beams, and other work, except where such chamfer, bevel or splay is more than 4 in. wide measured diagonally across the surface.

Each class of concrete having a different proportion of cement, sand or aggregate shall be measured and described separately in accordance with the accessibility and location or purpose of the work. Concrete in different members of a building or structure shall be measured and described separately according to the amount of labor required in pouring. Concrete with large stones and rocks embedded in it (cyclopean masonry) shall be measured as one item and described according to the richness of the mixture and the percentage of rock.

In no case shall the measurement of concrete be held to include the forms. In no case shall an excess measurement of concrete be taken to pay for the cost of forms of extra labor in placing. Concrete in stairs shall be measured by the cubic foot and shall include surface finish when the mixture is the same throughout.

(b) Structural Cast Concrete: The term is taken to include beam and slab construction by the various unit systems now in vogue. The unit of measurement shall be the cubic foot, and this shall be measured net as provided for monolithic concrete. The various members shall be measured on the ground before erection. Reinforcement shall be measured separately as provided under Reinforcement. The unit of measure for erection shall be the pound weight of the finished member. Cast concrete with crushed stone or gravel aggregate shall be assumed to weigh 150 lb. per cu. ft.

(c) Cast Concrete Trim and Ornamental Work: Cast building trim shall be measured by the cubic foot, but the measurement shall be the smallest cube which will contain the piece measured and not the actual net volume of the piece. No allowance shall be made for forms. Mitre block for cornices, etc., shall be measured separately from straight molded work. Circular work shall be measured separately from other work. Vases, seats, pedestals, balusters, and other similar items shall be taken by number and description. No allowance shall be made for reinforcement. No allowance shall be made for surface finish.

(d) Sidewalks: Shall be measured by the square foot. The one measurement shall include concrete finish, lining in squares, and cinder or stone foundation. Curbs and gutter work shall be measured by the lineal foot and separated according to character and size, and shall include foundations, forms, finish, and cost of special tools, if any. In measuring curbs the full height, width or thickness shall be taken. The measurement of sidewalks shall be taken the full width. Circular corners and curbs and gutters shall be measured separately by number, stating the radius and the length measured on the curve. Vault lights shall be measured by the square foot, the measurement to include glass, forms, steel and finish. Beams under vault lights shall be measured by the lineal foot. In measuring vault lights the measurement shall go at least 4 in. beyond the outside line of the glass in each direction.

Forms

The unit of measure for form work shall be the square foot of actual area of the surface of the concrete in contact with the forms or false work. Forms shall in every case be measured and described as a separate item and in no case shall the measurement of concrete be taken to include forms. No deduction shall be made in the measurement of surface of concrete supported by forms because of forms being taken down and re-used two or three times in the course of construction.

The unit price for superficial measurement of forms shall be deemed to include the cost of struts, posts, bracing, bolts, and wire tires, and the oiling, cleaning and repairing of forms. No allowance shall be made for angle fillets or bevels to beams and columns, etc., but curved moldings shall be measured and described separately as hereinafter provided. No deduction in measurement of forms shall be made for openings having an area of less than twenty-five (25) sq. ft. No deduction shall be made in floor forms for heads of columns. No deduction shall be made in column and girder forms for ends of girders, cross beams, etc. No allowance shall be made for pockets in column forms for clearing out rubbish.

The measurement of column forms shall be the sum of the girth of the sides or circumference multiplied by the height from the floor to the under side of floor slab above. The measurement of beam forms shall be the net length between columns multiplied by the sum of the breadth and twice the depth below the slab, except for wall beams and other beams at an edge of the floor, which shall have the thickness of the floor slab added to twice the depth. Wall forms shall be measured for both sides of the concrete wall when forms are required for both sides. Allowance shall be made by number for pockets left for future beams.

Forms to octagonal, hexagonal, and circular columns shall be measured and described separately from forms to square columns. Caps and bases to columns and other ornamental work shall be measured by number and fully described over all dimensions. The curved moldings in form work shall be measured by the lineal foot. Forms to circular work shall always be measured separately from forms to straight work. No measurement or allowance shall be made in slabs or beams for construction joints to stop the day's concreting. Construction joints or expansion joints to dams and other large masses of concrete shall, however, be measured. Forms to cornices shall be measured by the lineal foot, and the girth stated. (The term girth shall be taken to mean the total width of all curved and straight surfaces touched by the forms). Plain forms to back of cornice to be measured separately. Forms to different parts of structural building shall be measured and described separately according to their position in the building and cost and character of the work involved. Forms to window sills, copings, and similar work in situ shall be measured by the lineal foot. Forms to the upper side of sloping slabs such as saw tooth roofs shall be measured whenever the slope of such slab with the horizontal exceeds an angle of 25 deg. Forms to the under side of stairs shall be measured by the superficial foot. Forms to the front edge of the stairs shall be measured by the lineal foot. Forms to the ends of steps shall be measured by the number of risers.

Steel Reinforcement

The unit of measure of steel reinforcement shall be the pound weight. Steel rods for reinforcement shall be measured according to the net weight placed in the building. The weight shall be calculated on the basis of a square bar 1 in. square and 12 in. long, weighing 3.4 lb. No allowance shall be made for rolling margin. No allowance shall be made for cutting or waste. No allowance shall be made for wire ties, spacers, etc. In estimating reinforcement the bars shall be measured by the lineal foot as laid. All laps shall be allowed for.

The bars of each different size shall be measured and described separately, as also straight bars, bent bars, stumps, and hooping. Pipe sleeves, turnbuckles, clamps, threaded end nuts, and other forms of mechanical bond shall be measured separately by number and size and allowed for in addition. Wire cloth, expanded metal, folded fabric and other steel fabrics sold in sheets or rods, shall be measured and described by the square foot. The size of mesh steel in tension and weight per square foot shall be stated. No allowance shall be made for waste, cutting, etc. Deformed bars shall be measured separately from plain steel reinforcement.

Surface Finish

The unit of measure for finish of concrete shall be the square foot. Finish shall always be measured and described separately. No measurement or allowance shall be made for going over concrete work after removing of forms and patching up voids and stone pockets, removing fins, etc. Granolithic finish shall be measured by the square foot and shall include all labor and materials for the specified thickness. Finish laid integral with the slab shall be measured separately from finish laid after the slab has set. No allowance shall be made for protection of the finish with sawdust, sand or testing. Grooved surfaces, gutters, curbs, etc., shall be measured separately from plain granolithic and shall be measured by the square foot or lineal foot as the case may require.

The following shall be measured by the square foot: Cement wash (state how many coats); rubbing with carborundum; scrubbing with wire brushes; tooling; picking; plastering, etc. In making these recommendations it was desired to present a means of standardizing the practice in such work and thereby remove a frequent cause of disagreement between engineers and contractors.

Hudson Bay Company's Store now being erected at Calgary by Messrs. Carter Halls-Aldinger

Hudson Bay Company's Store, Calgary

The accompanying illustration is a view of the Hudson Bay Company's departmental store now being erected on [illegible] Avenue, Calgary, by The Carter-Halls-Aldinger Company, Limited. The building will be of steel, concrete and terra cotta construction, and will contain six storeys and basement. In the design, provision is made for the addition of four more storeys. The ground floor area is 130 x 250 feet, while the estimated cost of the building is $1,500,000, to which must be added $25,000 for the erection of a modern garage.

Cutting Roof Holes

An old, but perhaps not the best, method for laying off a hole for an upright round pipe in a slanting roof is to stand the pipe upright on the roof as shown in Fig. 1, and then by means of a steel square, or even a straight strip of wood, mark a number of points in the outline of the hole. It is evident that the heel of the square will rest upon that point of the roof through which the part of the pipe against which the straight-edge is placed would pass, and by marking a sufficient number of these points and drawing a line through them we can mark out the shape of the hole with great accuracy. By using a ruler, with a pencil or scriber fastened to the lower end, the process is somewhat simplified; but even then it requires two persons to perform the operation—one to hold the pipe plumb and the other to guide the ruler—the work being done on the unsteady footing of the roof.

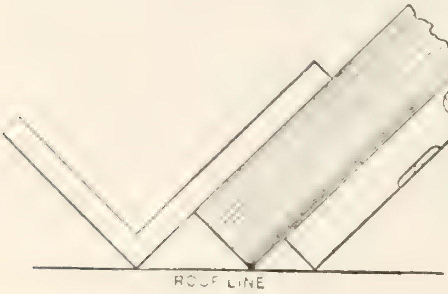


Fig. 1

The following is, to my mind, a much better plan, writes Albert Fair. This can be carried out by a single person and all the fine work be done at the bench or on a table.

Every student of geometry or mechanical drawing knows that when a cylinder or round pipe is cut square across, the cross section is a true circle—but when the cut is oblique or bias, as the ladies call it, the cross section is an ellipse of which the diameter of the cylinder is the shorter or minor axis, and the extreme length along the slope is the major or longer axis; and these two measurements are all that are necessary to enable us to describe the ellipse accurately. To apply this in practice proceed as follows:

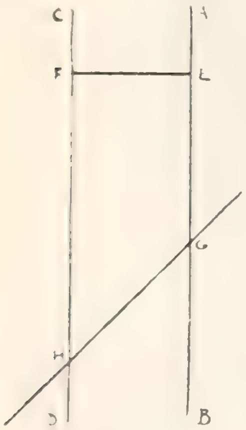


Fig. 2

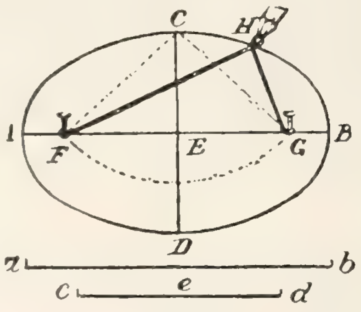


Fig. 3

Stand a plumb-rule on the roof and by means of a bevel get the exact slope. Next draw on a board or stiff paper (common sheathing paper is at good as any) two parallel lines at a distance apart exactly equal to the diameter of the pipe. Let A B and C D Fig. 2, be the lines representing the pipe; E F, a line drawn square across these two lines will be the minor axis, and G H, a line drawn across the two parallel lines at the same slope as that of the roof to the plumb line, will be the major axis of the ellipse; then on a piece of stiff paper or thin pasteboard draw two lines square with each other, as A B and C D, Fig. 3, and let A E and E B be each equal to half the longer axis and C E and E D each equal to half the shorter axis. With C as a center and A E or E D as radius, describe arcs cutting A B in F and G; F and G will be the foci. The ellipse may now be described by various methods, one of which is to use the steel square as a sort of trammel, but the simplest method is to drive three fine wire nails, one at C, one at F and one at G, and tie a thread around them as shown in Fig. 3. The thread should be linen, of a kind that will stretch as little as possible, and it is well to wax it before using it. Then place the point of a pencil in the loop at H and move it around the curve, keeping the thread taut. The pencil will mark out an ellipse which is the exact shape and size of the hole you require. Cut the ellipse out of the paper or pasteboard and you will have a template by which you can mark out on the roof the outline of the hole. One advantage of this method is that you can move the template about so as to get the best position on the roof.

The action of chemicals on concrete is commented upon by Mr. George G. Kennedy, superintendent of the water department at Harrisburg, Pa. At the filtration plant hypochlorite of lime is used as a sterilizing agent and is contained in two concrete solution tanks, separated by a division wall from the mixing compartment. Both the side walls and division wall showed a great deal of pitting. The bottoms of these tanks, which are of granolithic finish, exhibited no evidence of disintegration. To check the trouble the sides were cleaned off with compressed air, a coat of cement mortar applied and the repairs finished with a coating of bitumen paint, applied hot. This work, Mr. Kennedy reports, has been finished so recently that the durability of the repairs cannot be determined, but so far the protective coating has given satisfaction.

The new Fratt Bridge, which is now being completed across the Missouri River at Kansas City, is operated by electric motors, and is arranged to clear steamboat traffic on the lift principle. Besides the unusual provision of its movable lower deck, the 425 ft. main span, carrying two railway tracks, two electric car tracks and two footpaths, has also the distinction of being the longest rivetted span ever built. The bridge is a double-decked structure, the lower platform of which, carrying the railway tracks can be drawn up against the main bridge floor by steel cables which pass over motor-operated drums and sheaves, and are counterbalanced by great concrete weights. The platform has a vertical rise and fall of 46 feet, clearing the water by 65 feet, when in its raised position. The lifting is done by two 250 horse power 550-volt direct-current crane motors.

Pumice stone-concrete floors have been used for various concrete buildings in Germany with great success. They are in form of large slabs, which are placed over the construction beams. Upon these, wire mesh reinforcement is laid which is again covered by a second concrete slab. Fire tests made with these floors proved that they were able to resist a heat of 1099 deg. C. for two hours without showing any effect.

Uniformity in Plans

NOTEWORTHY suggestions were made in an address delivered recently by President J. W. L. Corning of the Minnesota State Association of Builders' Exchanges, who says:

"An era of specialized industries has developed a custom in building lines for material men to submit bids on their special lines to the general contractor upon which he in turn bases his general proposal.

"This custom has been of great value to the owner but has brought a train of evils that we believe could be eliminated to the benefit of the architects, contractors, sub-contractors and material men and result in bringing about a condition whereby the architect's ideals might be more fully carried out; the owner might receive what he thinks he bargained for; the contractor and material men might receive a rational and safe margin of profit; misunderstanding be lessened, and the product be a credit to all.

"In order that existing evils might be remedied and that the better conditions referred to be brought about, the Minnesota State Association of Builders' Exchanges appointed a committee of its members some time ago to confer with a committee from the Minnesota Chapter, American Institute of Architects. As a result of conferences of these committees and of a canvass of hundreds of operators and architects throughout the state and adjoining territory, the following suggestions for securing uniformity in plans and specifications have been compiled:

"First.—That specifications be indexed and divided into numbered paragraphs covering the various lines of material entering into the construction of buildings, with sub-headings of the various parts, so that each material man or sub-contractor may find his special part of the building clearly defined under its own heading. To assist the architects in getting results we have prepared a schedule, which we enclose, of headings and sub-headings, and recommend its general use.

"Second.—That floor plans or elevations be drawn at not less than ¼ in. scale.

"Third.—That each set of plans have, when estimates are called for, scale drawings of interior fixtures, such as stairs, wainscoting, mantels, book cases, linen cupboards, kitchen and pantry fixtures, etc.

"Fourth.—That each set of plans have, when estimates are called for, at least one sheet of details drawn at not less than ¾ in. scale, showing stone, metal, terra cotta, or wood cornice, pitch work, frames, interior finish, cut stone, etc.

"Fifth.—That the size of glass be marked on plans or elevations for all outside windows and transoms and for all partition sash and transoms.

"Sixth.—That the size of brick openings be marked on plans or elevations.

"Seventh.—That the kind of wood for each room be well defined in the specifications or on the floor plans.

"Eighth.—That the plans indicate the various parts that are brick, cement, stone, artificial stone, terra cotta, slate, marble, glass, metal, wood, etc.

"Ninth.—That piping plans distinguish heating, refrigerating and water pipes for covering.

"Tenth.—That finishing hardware be reserved for the owner to select and pay for.

"Eleventh.—That leaded and ornamental glass be reserved for the owner to select and pay for, or that the price per square foot be stated in the specifications.

"Twelfth.—That gas and electric fixtures be reserved for the owner to select and pay for.

"Thirteenth.—That specifications should not contain clause requiring contractors, at their own expense, to furnish labor or material not shown on plans or called for in specifications.

"Fourteenth.—That in order that further uniformity might prevail it is requested that the symbols prepared by the Standardization Committee of the Minneapolis Architectural Club and sent to the architects by that association, be generally used.

Standard Contract Adopted at Montreal

THE Montreal Builders' Exchange and the Province of Quebec Association of Architects have agreed on a standard contract which will be used by members of both organizations. In our issue of April 3rd we published the contract and general conditions as amended at a meeting of the architects' association. This special committee of the association to which the amended form was referred again made some further alterations, and in the final form it has been agreed to by the Builders' Exchange.

The Standard Form of Agreement Approved by the Province of Quebec Association of Architects and the Montreal Builders' Exchange

This form to be used with the Standard General Conditions of the Contract.

This Agreement made the ... ... day of ... .
in the year Nineteen hundred and ... ...
by and between ... ...
party of the first part (hereinafter called the Contractor).
and ... ...
party of the second part (hereinafter called the Proprietor).
Witnesseth that the Contractor and the Proprietor for the considerations set forth agree, the one with the other, as follows, that is to say:—

Article 1. The Contractor shall provide all the materials and perform all the work shown on the drawings or mentioned in the specifications prepared by ... ... (hereinafter called the Architect), for ... ...

... ...

which drawings and specifications are identified by the signature of the parties hereto and become hereby a part of this contract.

Article 2. The Contractor shall complete the whole of the work comprehended in this agreement by and at the time or times hereinafter stated, to wit:— .. ..

... ...

and in the event of failure so to do shall pay or allow the Proprietor the sum of ... ...

... ... Dollars per day as liquidated damages for each day thereafter that the work remains uncompleted.

Article 3. The Proprietor shall pay the Contractor in current funds for the performance of the Contract the sum of ... ...

Dollars

subject to additions and deductions as provided in the General Conditions of the contract and such payments shall be made ... ... on the Certificate of the Architect as the work progresses to the value of ... ... per cent. of the work done and materials incorporated in the building as estimated by the Architect.

The final payment shall be made within ... ... days after the entire completion of the work covered by this contract and its acceptance by the Architect.

Article 4. The said parties for themselves, their heirs, executors, administrators and assigns do hereby agree to the full performance of the covenants herein contained.

In Witness Whereof the parties to these presents have hereunto set their hands and seals, the day and year first above written.

....

IN PRESENCE OF ....

General Conditions of the Contract

To Apply to All Trades

This form to be used only with the standard form of agreement.

1.—The Contractor shall provide all necessary plant, tools, scaffolding, materials and labor and shall execute and complete in the best and most workmanlike manner the whole of the work required by the plans and specifications and shall at the conclusion of the works deliver same in perfect condition and to the satisfaction of the Architect.

2.—The Contractor shall examine and satisfy himself as to existing conditions of site and premises before submitting tenders.

3.—The Contractor shall obtain and pay for all necessary permits and comply with all local by-laws or regulations and shall be held responsible for any violation of the same.

4.—The Contractor shall be responsible for the correct setting out of the work and for all lines and levels; but the Proprietor shall establish the boundary lines of the lot and furnish any necessary information as to servitudes.

5.—The Contractor shall provide everything for the proper protection of his work and of the adjoining properties, and shall hold the Proprietor free from any loss either by accident or by damage to person or property and shall at his own expense insure the workmen under his control against injury or accident.

6.—The Contractor shall do all necessary cutting and repairing of his own work for the accommodation of the other trades.

7.—The Contractor shall remove all rubbish or materials not required and at the completion of the works shall leave the whole of the premises clean and in perfect condition. In the event of separate contractors being employed and a dispute arising the Proprietor shall remove the rubbish and charge the cost of same to contractors as decided by the Architect.

8.—The Proprietor shall maintain fire insurance for the amount paid by him to the Contractor. The Contractor shall insure and hold the proprietor free from any loss by fire on the balance of the work not paid for and for all plant and tools.

9.—The Contractor shall give his work his personal supervision and shall provide a competent foreman for each trade on the works at all times.

10.—The Proprietor shall have the power to order the removal, after 24 hours' notice, of any workman considered to be incompetent—should the Contractor refuse or neglect to supply a sufficiency of properly skilled workmen or materials of the proper quality, or fail to prosecute the work with due diligence, such failure or refusal being certified by the Architect, the Proprietor shall be at liberty, after 48 hours' written notice to the Contractor, to provide any such labor or materials and to deduct the cost thereof from the contract sum, or shall be at liberty to terminate the employment of the Contractor and to take possession and complete the work included in the contract. In the case of such discontinuance of the employment of any Contractor he shall not be entitled to receive any further payment until the work shall be finished, at which time any balance shall be paid to the Contractor, but if the unpaid balance shall not be sufficient to complete the works then the Contractor shall pay to the Proprietor the amount of such difference. In the event of a disagreement as to any part of this clause such disagreement shall be settled by arbitration as provided under Clause 18, but the Contractor must be notified within 48 hours that the complaint has been filed with the Architect.

11.—The Contractor shall at all times provide safe and proper facilities for the inspection of the works.

12.—The drawings and specifications furnished being instruments of service are the property of the Architect and must be returned to him on the completion of the works.

13.—Figured dimensions shall be followed in preference to measurements by scale and large scale drawings in preference to smaller.

14.—Should the Contractor be delayed in the prosecution of the work by the act or default of the Proprietor or by a general strike or lockout of a trade or by any person employed by the Proprietor or by reason of authorized extras or additions, then the time fixed for the completion of the works shall be extended for a period equivalent to the time lost; but no such allowance shall be made unless written notice is presented to the Architect within 48 hours after the commencement of the cause of such delay.

15.—No variations, omissions or additions made upon the order of the Proprietor shall be deemed to make null or void the terms or time of completion of this contract and all additions or deductions shall be made only upon the written order of the Proprietor, and if any additional time shall be required such notification shall be given at the same time.

16.—No certificate given, nor payment made under the contract, nor partial nor entire occupancy of the premises by the proprietor, shall be construed as an acceptance of defective work or of improper material, or as condoning any negligence or omission; and the Contractor shall make good without cost to the Proprietor, all such defective work or materials and the consequences thereof, until twelve months of the date of the final certificate. This general guarantee shall act as a waiver of any specific guarantee for any other length of time in this contract.

17.—If at any time there shall be evidence of any lien or claims for which, if established, the proprietor might become liable, and which is chargeable to the contractor, the proprietor shall have the right to retain out of any payment due a sufficient amount to completely indemnify himself against such lien or claim.

Should there prove to be any such lien or claim after all payments are made the contractor shall refund to the proprietor all moneys that the latter may be compelled to pay in consequence of the contractor's default.

18.—In case of a dispute between the proprietor and the contractor, such dispute shall be submitted to arbitration. The arbitrator shall be one person if approved of in writing by both parties, otherwise each shall choose one arbitrator and these two shall select a third. In the event of failure to agree upon the third arbitrator he shall be appointed by a judge of the Superior Court in the district where said work is performed. The decision of the arbitrator or arbitrators to be final and the cost and expenses of the arbitration to be apportioned as he or they may determine.

The Corporation of Kenora, Ont., has awarded to Allis-Chalmers-Bullock, Limited, of Montreal, the contract for another hydro-electric unit. It will consist of two twin horizontal turbines in open flume, both being connected to form a quadruplex turbine of 900 h.p. at 150 r.p.m. under a head of 17 to 23 feet, an alternator of 625 kw. 3 phase, 60 cycle, 2400 volts and a self contained oil pressure governor. This will make the fourth water wheel type alternator of the same capacity built by this company for Kenora.

Noteworthy Development at Vancouver

Building Trade Conditions — Excellent Record to Date — Many Noteworthy Projects—Municipal, Government and Railroad News

Office of Contract Record,
Vancouver, April 24, 1912

VANCOUVER is forced to yield the palm only to Toronto in the record of building permits for the first three months of the present year, and as the Ontario capital possesses nearly four times the population of the Pacific port. it is regarded as reasonable that she should outdistance Vancouver. The building permits issued in this city during the above period amounted to $3,335,407.

General conditions in the building trades here are excellent and another record year is anticipated.

The Labor Outlook

So far as the local building trade is concerned the supply of labor at present is sufficient to cope with the demand. Whether there will be a shortage in the supply as the season advances it is difficult to determine at present. Since the fame of Vancouver has been noised abroad as a city where both skilled and unskilled labor enjoys exceptional advantages as to wages, etc., numbers of carpenters, plasterers, bricklayers, stone-cutters and others journey to this city every summer from Pacific Coast cities in the United States where existing conditions are not so favorable. Then the large numbers of men which are constantly arriving from the old country, help to keep the labor market well supplied and in these days it is hardly likely that construction work in and around the city proper will be retarded to any extent during the entire season.

An Important Building Project

An 8-storey and basement store and apartment building is to be erected on Gilford street in the near future at a cost of approximately $225,000. The building will be of reinforced concrete, fireproof throughout. The site is 66 by 132 feet facing three streets. The three elevations will be faced with mat glazed terra cotta and pressed brick. The building will contain 77 apartments and will be replete throughout with the most elaborate improvements and furnishings. The architect is Mr. W. P. White, of Vancouver.

Eight-Storey Store and Apartment Block to be erected on Gilford Street, Vancouver

Molson's Bank

The new six-storey office building of the Molson's Bank, on the corner of Hastings street and Market Lane, Vancouver, will be of reinforced concrete construction, faced with pressed brick and architectural terra cotta. The banking room will occupy the entire ground floor. The main entrance vestibule will be decorated with Italian marble. All the stairs will be of marble, and the corridors will have tile floors. The upper floors will be divided into fully equipped offices. Gas will be supplied for the convenience of doctors and dentists, and vaults are to be included in the building for the use of tenants. Plans were prepared by Messrs. H. L. Stevens & Company, who will also undertake the construction of the building. It is expected the building will be completed by 1st of December next.

East End Branch, Molsons' Bank, Vancouver

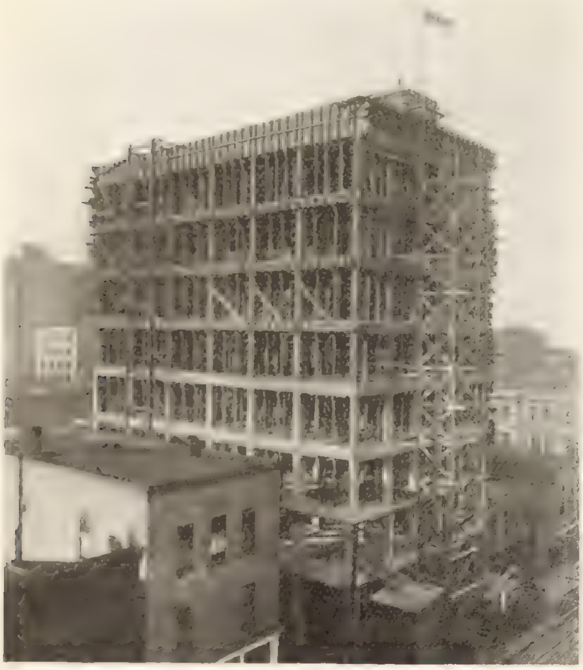
Government Estimates

Included in the Dominion government estimates for British Columbia recently made public, appropriations have been made for the construction of a new telegraph line from Vancouver to Powell River, a distance of [illegible] miles, where a paper manufacturing town is springing up, and another line from Bella Coola to 150-Mile House, Cariboo. The first line will cost $27,000, and the second $45,000. Altogether the estimates contained $362,758 for works in Comox-Atlin. A grant of [illegible] has been made for a public building in Prince Rupert, which is ultimately to cost [illegible]; the sum of [illegible] will be spent on a new quarantine wharf; $25,000 has been set aside for a building for the Customs department, and $6,000 for the immigration de-

[illegible] Substantial sums ranging from $3,000 to $6,000 have been voted for wharves and improvements at Courtney River, Hardy Bay, Lascuita Bay and the Naas River, Stewart River, and the Upper Lilloet River, and Lockport and Masset Wharf. Savary Island residents and campers are to have a new wharf costing $5,000, and a fine wharf costing $15,000 is to be constructed at Holberg Bay. The removal of obstructions in several of the up-coast rivers is also provided for in the estimates

Development at Strathcona Park

Mr. Reginald Thompson, former city engineer of Seattle, has been selected by the provincial government of British Columbia to make a thorough and comprehensive exploration of Strathcona Park, on Vancouver Island, and to lay out a complete programme for its development, together with a scheme of trunk roads throughout the Island. The entire plan of park improvements and road connections will continue over four years. Strathcona Park is a reserve in and about the centre of Vancouver Island, 125 miles distant from Victoria, and contains 240 square miles. The sum of $100,000 has been provided for the work this year. The organization of the main expedition is almost completed and Mr. Thompson expects to despatch his parties to the scene of operations early in May. These include engineers and road building experts from the public works department, timber cruisers, surveyors, a naturalist, botanist, and an expert photographer. It is intended to employ the entire summer in field explorations, surveys, etc., and upon the report to be presented by Mr. Thompson in the autumn the plan to be adopted in laying out the Island trunk road system will largely depend. Those who have visited the vicinity of the park say that it can be made easy of access and at the same time one of the most beautiful for scenery in the world, the summits of the park affording views of both the Pacific Ocean and the Gulf of Georgia.



Northwest Canada Trust Company's Building, Vancouver, a reinforced concrete building erected in 65 days

C.P.R. Lets Big Steel Contract

The Canadian Pacific Railway recently let the contract for 3,000 tons of steel to be used in the construction of an extensive addition to the Hotel Vancouver to J. Coughlan & Sons, of Vancouver. The plans for the structure, which have been prepared by Messrs. Painter & Swales, show that which is now known as the middle wing of the hotel is to be torn down to make way for a building which will be eleven storeys high for the present, and eventually seventeen. This contract, which involves over $200,000, calls for delivery within the next six months, and is said to be the largest of its kind ever awarded in Western Canada, if not in the whole Dominion.

Architectural Exhibition for Vancouver

Arrangements are now being made for the holding of Vancouver's first Architects' exhibition. Such an exhibition is recognized as an annual event among the architects of other cities in Canada, and should undoubtedly be regarded as such in Vancouver for the future. The British Columbia Society of Architects, which was organized in October last, has now got its several committees working satisfactorily and the necessary attention will be devoted to the holding of an exhibit. The display will include line and wash drawings, photographs and models, and will probably be held in the rooms of the organization in the Pacific Building early in the fall.

It is announced that contracts for the construction of the piers, landing stage, building platform and launching ways in connection with the construction of the G.T.P. drydock at Prince Rupert have been awarded to the British-American Construction Co. These are preliminary contracts, and the work will commence immediately. Bids have been called for hardware work from firms in Vancouver and Victoria, and all material will, as far as possible. be purchased in British Columbia. Work on the actual drydock and the buildings in connection with the plant will be commenced as soon as the preliminary work already mentioned, has been completed, and detailed plans prepared. The G.T.P. agreement with the government calls for completion of the work within two years. The drydock will have a lifting capacity of 20,000 tons; sufficient to handle any steamer on the Pacific. The first consignments of material have already been despatched north. The lumber for the work is being obtained from the Lester W. David Company, Ocean Falls, and the creosoted lumber contract has been awarded the Dominion Creosoting Company, of Eburne, near Vancouver.

The combined councils of South Vancouver and Burnaby municipalities recently appointed a committee to interview the provincial government to request co-operation in defraying the cost of building a well-paved roadway between New Westminster and Vancouver, a distance of about twelve miles. The estimated cost of the highway amounts to fully $600,000. The aim is to make the road interprovincial or inter-municipal, to have the best paved highway in Canada, a road constructed of the most durable material, asphalt being recommended as the best surface material.

The ratepayers of the city of Nanaimo, the coal city, on Vancouver Island, will be called upon in the near future to vote on a by-law authorizing the borrowing of a sum not exceeding $50,000 for laying an 18-inch steel water main from No. 1 reservoir to the city limits, and to improve the distributing system within the city.

Mr. John Callaghan, who it is understood has accepted the position as chief engineer of the Pacific Great Eastern Railway, visited Vancouver lately in connection with the location of the route between North Vancouver and Fort George. The construction of the line from Port Atkinson, a few miles west of North Vancouver to Newport at the head of Howe Sound, and from a point in Squamish Valley to Green Lake summit will be the first work to be undertaken on account of its heavy character. Eleven miles of line built by the Howe Sound & Northern Railway, now being operated as a logging railroad, will be taken over by the new company. Survey parties will be placed in the field early in May. Mr. Callaghan has been in the service of the engineering departments of the Grand Trunk Pacific, Great Northern, and Canadian Pacific Railways, latterly acting as assistant to Mr. B. B. Kelliher, chief engineer of the G.T.P. Railway, and being in charge of the construction work of the G.T.P. main lines west of Edmonton.

Engineers will be placed in the field at once by Mr. F. F. Busteed, to whom has been allotted the task of directing the work of regrading and double tracking the C. P.R. from Vancouver to Calgary. Mr. Busteed has rented a suite of offices in a central part of Kamloops, and will instal his staff there at an early date. The work will take three years to complete and will cost several millions of dollars. In many parts of the line an entirely new grade will be established. Along the Fraser Canyon and some parts of the Thompson valley, notably along Kamloops Lake, and between Spence's bridge and Lytton, there will be an enormous amount of rock work to be done. Many new tunnels will be made.

Hon. Dr. Young, Minister for education in the province of B.C. has received over 200 applications for plans of the contour of the University grounds at Point Grey in connection with the public competition for designs of the proposed college buildings. Several applications came from Europe. The competition closes on July 1st next.

The largest and most ponderous steel girders, it is stated, that have ever been moved into a Vancouver building, were recently placed in position by the Norton Griffiths Construction Company in the new B. C. Securities Building on the corner of Pender and Homer streets. There are five of these girders, each of which measures approximately 50 feet in length, and weighs 20 tons.

The directors of the Revelstoke (B.C.) Hospital Society recently awarded the contract for the erection of the new hospital addition to Mr. O. W. Abrahamson, a prominent contractor of that city. The total expenditure will be approximately $65,000 to $70,000 and work is already commenced. Mr. W. H. Wallace, a Revelstoke architect is engaged in preparing plans and specifications of the addition.

There has been some talk of late in regard to the difficulty of obtaining crushed rock and gravel for the Vancouver city contracts. City Engineer Fellowes is of the opinion that it might be advisable to arrange for shipments from Vancouver Island to augment the supplies obtained locally. With this object in view Mr. Fellowes, while visiting Victoria recently, inspected the gravel pits and rock quarries at Albert Head close to the capital, and made enquiries concerning the output, facilities for supplying crushed stone and other supplies for Vancouver contractors and for the city.

Lively Progress at Calgary, Alta.

Correspondence of the Contract Record

Calgary, Alta., April 24, 1912.

Building operations in Calgary are progressing rapidly and almost every contractor is busy. Contracts for several new buildings have been let, many other buildings closed for the cold weather are showing renewed life, while tenders are being called for a great many large jobs. Each week finds the local newspapers announcing some new skyscraper—and every one believes what they read in the Calgary newspapers when it is about buildings. The building permits for the month of March exceeded $1,000,000, and for April they should be well over $1,500,000. To add to the impetus given all operations by the early opening of spring, both the Grand Trunk Pacific and the Canadian Northern railroads have now announced that their lines will enter Calgary by July 1—and that means they must build terminals in the city. The Grand Trunk have been attempting to secure the property on Ninth Avenue East, now occupied by the Mounted Police Barracks, and have announced their attention of spending some $500,000 on terminals here. The latest gossip is that the Great Northern and the Canadian Northern will join forces in Calgary.

Both the Provincial and the Dominion Governments will add to the buildings in Calgary this year. The Provincial Government has been asking for tenders for a new Court House to be built here, and the recent Budget from Ottawa gives to Calgary a new addition to the post office, besides a new customs warehouse and other buildings.

The city of Calgary will do a large amount of work, too. The contract for the first of the school houses has been let to Messrs. Doyle & Thomas, of this city, at a cost exceeding $175,000, and already tenders are being asked for two other buildings similar to the first now being built. These schools are of brick and stone, and reinforced concrete, the Kahn system being specified for all. The city is now calling for tenders for an electric sub-station and has advertised the by-laws to authorize the construction of numerous other municipal betterments, such as sewers and conduits. The first survey for a new gravity water supply for the city was started recently.

Work on the C. P. R. hotel goes ahead, and preparations are all made to handle the structural steel for rapid erection, the steel being now en route. The contract for the new addition to the station is being handled by J. McDiarmid & Company, and is proceeding rapidly. Work on the $1,000,000 Hudson's Bay store has been resumed, and the contractors are proceeding with the work of excavation. About one hundred men are now busy at the C. P. R. car shops, grading and excavating, and it is expected that the actual construction will commence shortly. The contract for the Mountain Spring Brewery, close to the car shops, has been let to Messrs. Chamberlain & Irving, and as their materials were already on the ground, they are progressing rapidly.

Labor conditions continue encouraging and there seems to be sufficient work for all who are so minded. It is reported that there is a lack of common labor on the C. P. R. irrigation work at Bassano, and also on the pipe line for the natural gas line from Bow Island to Calgary. This work was opened up on April 8th and the contractors have already three large trenching machines at the work. The cost of this development will exceed $4,000,000, the whole being divided into two parts. The contract for the northern end has been let to James C. Corcoran & Company, of Pittsburg, and the southern end went to Driscoll & Connor, of Indianapolis. A great many of the trades have announced their intention of asking for higher rates and some trouble may be anticipated before the new agreements are made acceptable to both parties. The same conditions exist in both Edmonton and Lethbridge. Agreements now being drawn up all contain the stipulation for more pay.

—W. W. H.

Mr R. Marpole, general executive of the C.P.R., paid a visit to Victoria recently, his object being to arrange for the commencement of active construction work on the extension of the Vancouver Island division of the C.P.R from the present terminus at Wellington to Campbell River and Hardy Bay. The Canadian Northern Pacific Railway Co. has announced that tenders will shortly be invited for the construction work northward from the present terminal of the C.N.P. on Barkley Sound to Comox, and the north end of the island. From this it would appear that the two railroads are vieing with each other in efforts to reach the north end of Vancouver Island.

Personal Mention

Applications for the position of City Engineer of North Vancouver will be received until May 9 by Thos. Shepherd, city Clerk.

It is stated that Mr. L. A. Thornton, City Engineer of Regina, has been promoted to the position of Works Commissioner and that his assistant, Mr. Mead, will become city Engineer.

After 35 years in the service of the city Mr. C. H. Rust has resigned the position of city engineer of Toronto to accept a similar post at Victoria, B.C. Mr. Rust's salary at Toronto is $6,000. His commencing salary at Victoria will be $6,500. A short sketch of Mr. Rust's career was published in our Special Annual Number of April 24, 1912. Mr. Rust entered the service of the city of Toronto in 1877 as rodman and progressed through the various stages to principal assistant, deputy city engineer, and finally, in 1908, city engineer. Last year Mr. Rust was President of the Canadian Society of Civil Engineers.

Mr. C. H. Rust, the new City Engineer of Victoria, B. C.

Mr. G. R. Heckle, construction manager of the Ambursen Hydraulic Construction Company of Canada, Limited, Montreal, has been on a visit to the huge irrigation dam which the company are building at Bassano, Alberta, for the Canadian Pacific Railway.

Mr. Jno. Conn, of Windsor, Ont., well known throughout Western Ontario as a successful paving contractor, died suddenly last week at Windsor. The late Mr. Conn was identified with the Tarolithic Paving & Construction Company, of Chatham and Detroit.

Mr. J. L. Feeney has obtained an appointment on the engineering staff of the federal department of public works and will shortly resign the post of City Engineer of Fredericton, N.B. Mr. Feeney went to Fredericton two years ago to succeed Mr. A. K. Grimmer, who is now City Engineer of Medicine Hat.

Mr. W. W. Hay, the newly appointed secretary of the Builders' Exchange, Calgary, graduated in 1910 from the University of Vermont with the degree of Bachelor of Science in Civil Engineering. After being identified for a time with C.P.R. construction, Mr. Hay made connections with Dominion Bridge Company at Lachine, Que. Leaving that concern later he became assistant to Mr. W. S. Painter, then C.P.R. architect. While in Mr. Painter's office Mr. Hay designed and detailed a large part of the extension to the Windsor Street Station, constructed recently by Messrs. Byers & Anglin. When Mr. Painter left Montreal, Mr. Hay went to Lake Louise as designing draughtsman and engineer. He remained there until February of this year, when he went to Calgary. Prior to his present appointment he served a short time as structural engineer in the office of the Calgary Building Inspector. Mr. Hay is undertaking the duties of editorial correspondent at Calgary for this journal.

Mr. J. C. Gardiner has been appointed county engineer of Welland, Ont. An expenditure of $400,000 will be made on road construction this season by Welland county. Mr. Gardiner is at present engineer for the city of Niagara Falls and also for the Dunnville, Welland and Niagara Falls Railway. He is a member of the Canadian Society of Civil Engineers.

Mr. D'Arcy Tate recently left Victoria, B.C., for London, Eng., to complete the financial arrangements in connection with the organization of the Pacific Great Eastern Railway. Upon Mr. Tate's return it is expected that construction work will be started immediately upon the line which will connect Vancouver with Fort George on the Grand Trunk Pacific.

Mr. J. H. Lauer's New Appointment

Mr. J. H. Lauer, secretary-treasurer of the Montreal Builders' Exchange, has resigned that position to become manager and secretary of the Marconi Wireless Telegraph Company of Canada, Montreal.

It is not too much to say that the Montreal Builders' Exchange owes much of its success to the organizing ability of Mr. Lauer. Although it had been in existence several years it was not until 1905, when Mr. Lauer was appointed secretary, that the association began to increase its membership and influence. It has now between 300 and 400 members, and is one of the leading institutions of the kind on the continent. Mr. Lauer's resignation becomes effective on May 1st.

Mr. J. H. Lauer, Montreal

Mr. Lauer is also Secretary of the Canadian National Association of Builders' Exchanges, which he founded in 1907. He intends to still hold this position, at any rate until the convention meets in Calgary next year.

Owing to his experience in labor matters, in October, 1907, Mr. Lauer was appointed by the Quebec Government to be a member (in the employers' interests) of the Board of Arbitration of the province for the settlement of labor disputes. In 1910, a further honor fell to him in being selected by the Shipping Federation of Canada to represent the shipping interests of Montreal for a term of five years on the permanent Board of Arbitration under the Lemieux Act. A number of awards have been given by this board which have given satisfaction. In the summer of the same year, the Ottawa Department of Labor selected Mr. Lauer to represent the shipping companies in a dispute with the shipliners and carpenters in Montreal. Although his award was a minority report, it was practically accepted by both sides as a solution of the difficulty and no strike resulted.

A committee has been appointed by the Montreal Builders' Exchange to select a successor to Mr. Lauer.

Construction News and Notes

Owing to the constantly increasing volume of their business The Weber Chimney Company, Chicago, have removed their offices from 209 South State street to 1452-1456 McCormick Building.

Our Calgary correspondent informs us that Messrs. Craig & Rose, of Edinburgh and London, will build a large warehouse at Caglary and that this building will probably be followed later by the erection of a paint mill.

The Montreal Engineering Company, Limited, announces that on May 1 its offices will be removed to the Bell Telephone Building, 76 Adelaide street, west, Toronto, Ont., from their present location at 176 St. James street, Montreal.

The Chatham Bridge Works Company, Limited. have just completed the preparation of an interesting catalogue descriptive of all kinds of steel work, beams, columns, concrete work and reinforcement. Copies will be mailed upon request.

Farmers of Iron Springs and the Sundial District are endeavoring to have work started on the proposed Suffield-Kipp branch of the Canadian Pacific. It is possible that 25 miles of grade will be completed this year but the laying of steel is doubtful.

The Eberhard-Wood Manufacturing Company have opened a jobbing shop at 36 Lombard street, Toronto, where they will execute hurry-up orders in connection with their representation of the Dennis Wire & Iron Works Company, Limited, of London, Ont.

The Cedar Rapids Manufacturing & Power Company, Montreal, have invited tenders for the first section of their scheme for supplying power to the city. This will comprise the construction of the dyke and part of the power house, the cost being about $2,000,000.

The Canadian government is to call for bids shortly for the second section of the Hudson Bay railway. This section will be 100 miles long, the contract having already been awarded to J. D. McArthur for the first section of 180 miles from Las Pas to Thicket Portage.

Notice of change of address is given by the Decarie Incinerator Company, who have removed from Hopkins, Minn., to 345-47 McKnight Building, Minneapolis, Minn. The company are the sole manufacturers in U.S.A. of the Decarie patent incinerator for the disposal of garbage and refuse.

A syndicate of United States and Canadian capitalists, represented by Joseph Choate, Jr., New York City, has secured a 30-year franchise to build radial railways throughout Manitoba. This is the syndicate which will also take over the $25,000,000 street railway property of Mackenzie & Mann in Winnipeg.

Arrangements have been made for the engineers who are in charge of the construction of the eastern end of the new lake front line of the C.P.R. from Agincourt to Belleville and on, to have offices at Agincourt. The contractors will also locate their offices in that vicinity. The construction of this line, which is to give the Montreal-Toronto service a double track, will involve an expenditure of twelve million dollars, and the work is to be pushed ahead with the greatest speed. This line will also mean the opening up of several new stations along the lake front in the near future. It is likely that the line will be steeled to Oshawa in time to give a service before the end of the year.

The "Bitumastic" solution and enamels, manufactured by Messrs. Wailes Dove & Company, Limited (Canadian Agents, Messrs. Machan & Hebron, 55 St. Francois Xavier street, Montreal), have been adopted for painting the whole of the gates and structural steel work in connection with the Panama Canal, at a cost of $335,000. This is probably the largest painting contract ever awarded.

The franchises and all of the assets of the Ottawa & St. Lawrence railway and the North Lanark railway have been purchased by J. A. Morden & Company of Toronto, Ont. This road will run south from Ottawa to Morrisburg, thence westerly along the St. Lawrence River to Brockville, then north through Perth and Lanark to Arnprior, then following the Ottawa River to Ottawa, a total distance of 274 miles. The road will be bonded at $20,000 per mile, and it is understood that parties will shortly leave for London, England, to negotiate the sale of this bond issue.

A High Grade Machine for Concrete Workers

One of the greatest objections to the concrete block industry in the past was the alleged fact that high grade machinery could not be obtained for the manufacture of a concrete building unit in large quantities and of high quality. The line of machinery manufactured by the Jaeger Machinery Company, Columbus, Ohio, has done much to dispel this idea. The popularity of the Jaeger-Keny Hydraulic Pressure Concrete Stone Machine is increasing rapidly by reason of its simplicity, strength, efficiency and economy. The inventor, Mr. Keny, has had wide experience in concrete, while Mr. Jaeger, the man who perfected the machine, is an expert of wide experience in mechanical lines, particularly in the concrete field, to which he has devoted his attention for the last seven years. It is well known that a wet mixture will give a denser and more impervious concrete—other things being equal--than a semi-dry mixture. On this fact is based the high quality of the J-K stone. The mixture is used so wet that water runs off the stone when being pressed. It is claimed that with this machine a saving is effected of from 10 to 20 per cent. in cement and cost of carrying; that three men can easily produce 1,000 blocks a day; that the machine is readily adjustable for the manufacture of any size or shape of stone, with or without special facing; that 120 lbs. pressure is exerted on each block. The machine is compact, requiring only small floor space, and simplicity itself, all the work being done by the operation of one valve. Exceptionally high quality and excellent appearance are claimed for the blocks made on the Jaeger-Keny machine. The company's trade mark is reproduced herewith.

The Canada Steel Company's Products

Interesting Details of an Important Hamilton Industry which is making Rapid Progress—An up-to-date Plant

For the past fifteen years rail-carbon steel has been manufactured in the United States and large quantities of it are now being produced. Owing to the opposition of the mild steel manufacturers, steel of this kind has had a hard fight for recognition, but this is now largely a thing of the past. Only a few months ago, Cleveland amended its building laws so that bars rolled from selected T-rails might be used in all buildings where mild steel bars, rolled from billets were allowed.

High Quality Steel Used

All rails when ordered by railroads are required to conform to certain rigid specifications, to insure their being of good quality, and before being accepted are tested chemically and physically. The Canada Steel Company, Limited, rolls practically entirely from these rails. It is well known that the re-heating and re-rolling of these rails improves the quality of the steel. When the rails are rolled into bars, they are split into three pieces, as shown in Fig. 1. Three different shaped bars are rolled from the three pieces. This product has its well defined uses and for certain purposes is of much greater value than mild steel. It is not recommended for cold bending, although much work of this kind can be done on it, and especially in concrete work, but it can be bent and forged hot as readily as soft steel. A good blacksmith can weld it. It can be punched and sheared cold and threaded almost as readily as soft steel.

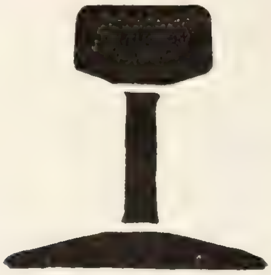


Fig. 1—Canada Steel Company—rail stock in process of re-manufacture

The different kinds of shapes manufactured consist of small angles from ⅛ inch in thickness up, flats, rounds, squares, channels, U-bars, etc., and are used principally for making agricultural implements of all kinds, reinforcing concrete, telephone cross-arm braces, etc.

Manufacturing Facilities and Process

The company's plant, which is situated on ten acres of land in the east end of Hamilton, is served by both the Grand Trunk and T. H. & B. Railways. Old steel rails purchased from the railroads in Canada and the United States are received at the west end of the plant and there from 3,000 to 6,000 tons are stored. As a first step in the process of manufacture of the product, the rails are cut up in lengths about 8 to 11 feet in length. These pieces are then charged into the end of a large continuous furnace, 40 feet long and 12 ft. 6 in. wide. They are shoved through by a large electric ram and when they come out at the other end they are red hot and ready to work. Fig. 2 shows the rails being charged into the cool end of the furnace. The rail enters cross-wise and each advance of the pusher moves forward all the rails in the furnace by a distance equal to the pusher's stroke and by the time they reach the other end they are at a proper heat to work. After the rails leave the furnace they are brought to the rolling mill. This consists of seven set of 12-inch, three high housings, and one set of pinions, as shown is Fig. 3. The first pass of the rail through the mill slits the rail into three pieces, as shown in Fig. 1. Each part is then picked up and passed back and forth through various sets of rolls and made into finished bars, such as angles, rounds, flats, etc. These bars are then dragged down on to the cooling beds and are straightened and cooled. They are then cut up into different lengths, loaded on buggies, weighed, and loaded into cars. The capacity of this mill is about 2,000 tons per month, as much as 75 tons having been finished in eleven hours.

The mill is operated by an a.c. motor, built by the Canadian Westinghouse Company. This motor is capable of developing 1,000 h.p. It is connected to the mill by a rope drive, shown in Fig. 4. The rope is 1¼ inch manilla and takes 28 turns around the pulleys, the latter having 35-ft. centres. The drive is of the continuous rope type, the tension being taken up on a travelling carriage. The motor runs at 425 r.p.m. and the mill at 180 r.p.m.

In addition to the above equipment there is a large and well-equipped machine shop, for repairs, and a roll turning

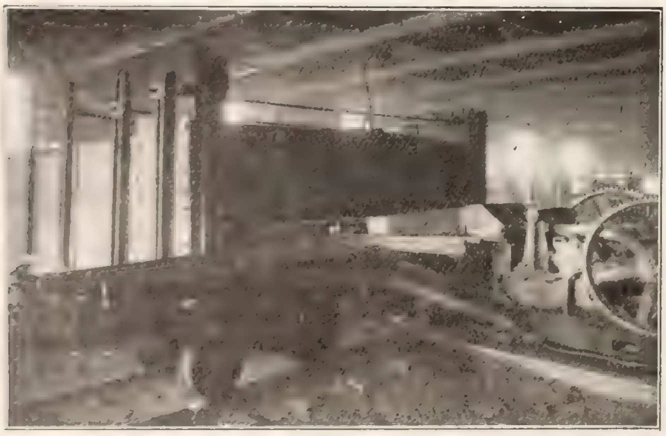


Fig. 2—Canada Steel Company—rail feeder and furnace

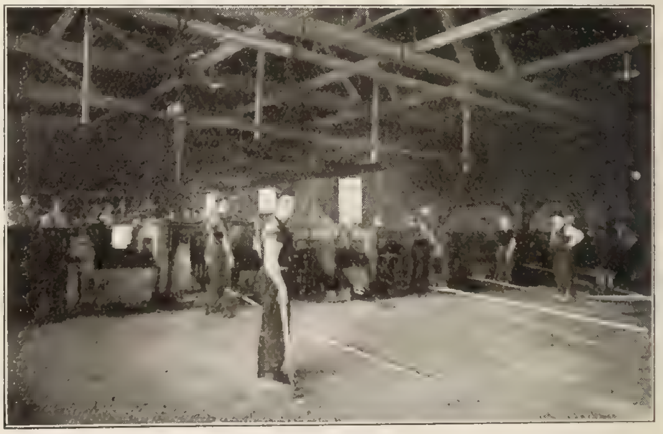


Fig. 3—Canada Steel Company—rolls equipment

shop for turning the rolls for the different sections manufactured.

The plant has now been running a year. Fig. 5 is a photograph of the plant as taken from the office, which is situated on Sherman avenue, Hamilton. Mr. W. M. Currie is the managing director of the company and Mr. W. W. Leck superintendent of the mill.

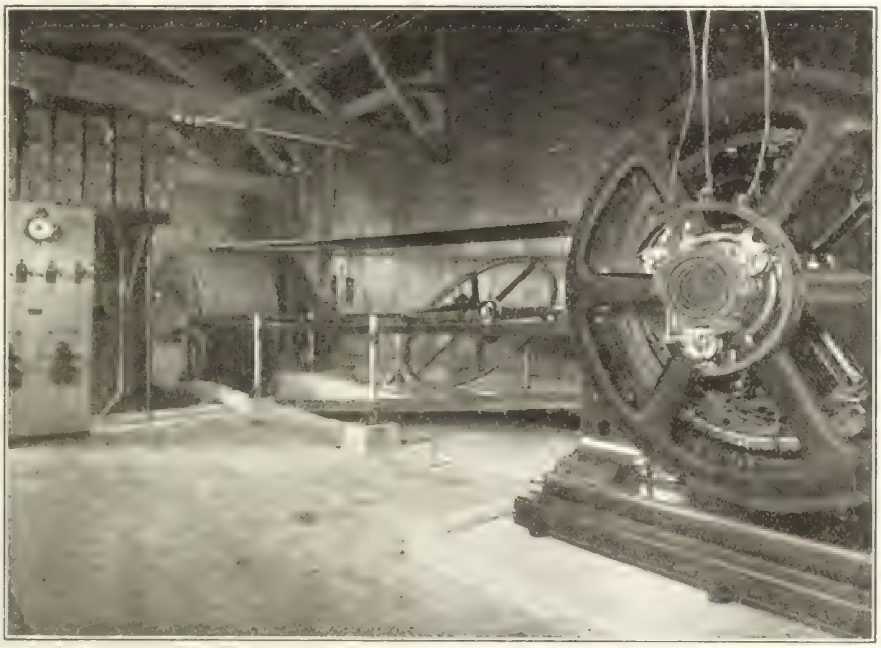


Fig. 4—Canada Steel Company's power equipment

Interesting Action at Montreal

A question involving the responsibility of a municipality for information given by the town engineer was decided on March 29th by Mr. Justice Archer, sitting in Montreal. His Lordship decided that when the by-laws of a municipality have been promulgated and have been placed in a register to which the public may have access, every citizen of that municipality is presumed to be aware of the nature of the by-laws and cannot lay claim to damages regarding incorrect information furnished him concerning the by-laws even though his informant be a public official of the municipality. The action was brought by Dame Caroline Drapeau, who sued the defunct muncipality of Notre Dame de Grace for $1,599.50, claiming that she had suffered to this extent as a result of certain actions of the pro-mayor and town engineer of the defendant, in providing her with incorrect information regarding the building by-laws in force in certain streets of the municipality.

In the early part of 1909 the plaintiff contemplated the erection of four flats on Minto avenue. She procured the necessary permit from the authorities, and had opened up building operations when she was informed by the town engineer and subsequently by the pro-mayor, in the course of a council meeting, that she could not legally build except she allowed a space of fifteen feet back of the street line. This restriction, said the officials, applied in the case of most of the streets in the municipality, that on which she was erecting the building being included in the list. Plaintiff, as a consequence, altered her plans, and instead of building a four-tenement house, she built only two flats. Later she disposed of her holdings, and subsequent to the sale, was made aware of the fact that contrary to the information she had received from the town officials, she would have acted within her rights in building up to the street line. Though the fifteen-foot limit was applicable to most of the streets, Minta avenue, the one on which she had built, was an exception. She therefore entered suit for the amount mentioned

Mr. Justice Archer in disposing of the suit, pointed

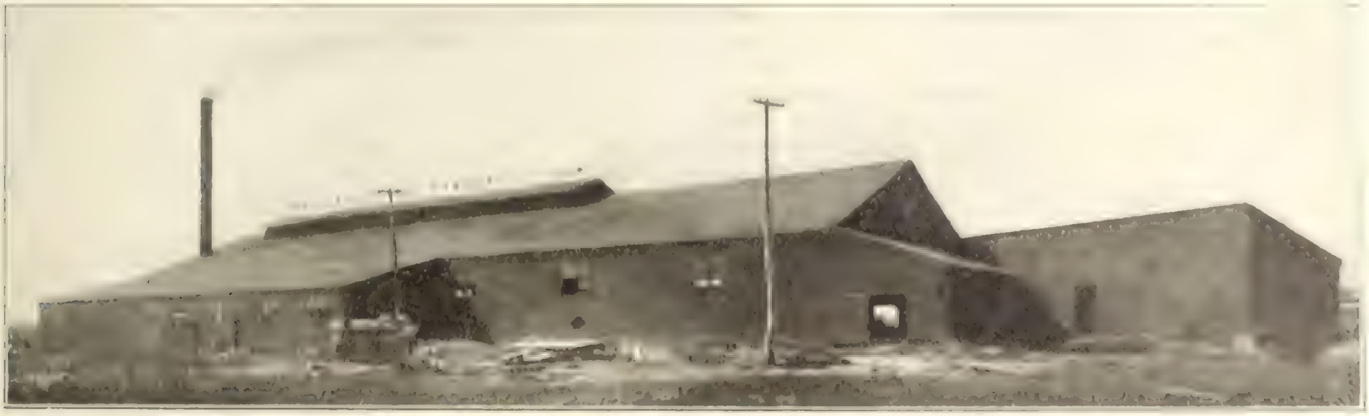
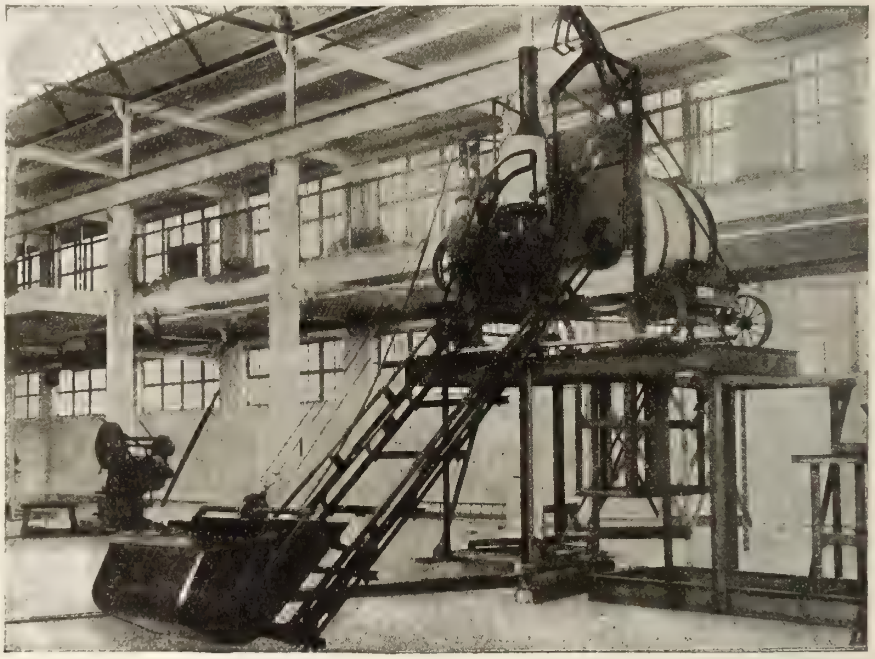


Fig. 5 Canada Steel Company's Plant, Hamilton, Ont

[illegible] of the municipality. The originals of such laws were inscribed in a public register, and were open to the scrutiny of all desiring to avail themselves of the privilege of scanning them. Moreover, the town clerk, by virtue of his office was obliged to furnish copies of said by-laws to all asking for them. Hence the plaintiff could and should have known of such laws. Moreover, the interviews with the pro-mayor and town engineer did not constitute a valid order to suspend building operations, and whatever notices were given by these officials could not be considered as of such effect as to bind the town authorities.

A Concrete Mixer with a Power Loader Extension

In construction work it is frequently an advantage to allow the mixer to remain on an embankment and have means of lowering the loading bucket so that it can receive its charges at some distance below grade. This is particularly adapted to railroad construction work where the mixer can be left on a flat car. To meet this demand, a form of Power Loader Extension has been designed by the Chain Belt Company of Milwaukee, Wis., manufacturers of Chain Belt Concrete Mixers, for application to mixers of any standard sizes. In the mixing plant shown in the illustration, which was recently sold to the George A. Fuller Construction Co., Ltd., by the Dominion Equipment and Supply Co., Winnipeg and Vancouver, for use on the Fort Garry Hotel, the leader travels down about fifteen feet, and has been found to work very satisfactorily. From experiments that have been made there seems to be no reason why these extensions cannot be made to operate successfully double this distance. The main channels are pivoted at a point on the loading side of the mixer, to permit the loader extension being adjusted to operate at any angle. The extension frame is so made that it can be detached at the pivot joint and replaced with a standard pivot bearing, so that if it is desired to use the mixer on the ground level, all that is necessary is to detach the extension bearing and attach the regular pivot bearing, the same loader being used in both cases. In using the standard pivot bearing, the wheels and rear axles on the power loader bucket will be unnecessary and will have to be removed.



Chain Belt Company's Power Loader Extension

From all that we can learn, Atcheson Barn Roof Lights, which have just been put on the market by the Metallic Roofing Company of Canada, Limited, Toronto, are the ideal solution for all classes of buildings on which corrugated iron is used as a covering. In a descriptive circular issued by the company the prediction is made that within a few years "people will no more think of putting on a roof without roof lights than of putting up a house without windows." Certainly the benefits to be derived from such lights are too apparent for comment. The desiderata are simplicity, weather-tightness and moderate cost, in all of which essentials the Atcheson Barn Roof Lights excel. The joints are rivetted and soldered at the Metallic Roofing Company's factory. Every part is made water-tight before shipment and the time taken to put them on the roof is no longer than would be occupied in placing an ordinary sheet of corrugated or flat iron. There is no cutting of sheets and no additional labor, and after allowing for the roofing material which it displaces the cost is very small. The various styles of sashes are described in detail in the circular which the company will doubtless be pleased to distribute, together with any further information required.

Canadian P. J. Mitchell Company, Ltd., Montreal

Three types of patent superheated steam engines are manufactured by Richard Garrett & Sons, Ltd., Leiston, England, the Canadian agents of whom are the Canadian P. J. Mitchell Company, Limited, 30 St. Francois Xavier street, Montreal. The types are single cylinder superheated steam, portable and semi-detached engines on loco-type boilers; compound superheated steam semi-stationary non-condensing engines; and compound superheated steam semi-stationary condensing engines. It is claimed that these engines are very economical, and will develop horse-power at a lower cost than a suction gas engine; also that the system of distribution by balanced piston valves enables the highest possible efficiency to be obtained. The crankshaft is made of a solid forging of the finest steel, and the webs are machined out of the solid. The crankshaft bearings are of a special "chain lubrication" type. A point to be noted is the corrugated firebox, which owing to its shape has 22 per cent. more crown plate heating surface than any flat-topped firebox of the same grate area. The makers manufacture Garrett's withdrawable type boiler and circular corrugated firebox, for which many advantages are claimed. There is a special apparatus for burning oil or other suitable liquid. The Canadian P. J. Mitchell Company are also agents for the Garrett 3-ton superheated steam wagon, L. Stearns & Co.'s refrigerating and ice-making machinery, the Rateau Steam turbines (impulse type), air compressors and water softening plants.

An interesting pamphlet descriptive of the various pumps manufactured by The American Well Works, Aurora, Ill., contains facts which should interest every prospective purchaser. The company manufacture a complete line of centrifugal pumps adapted to meet all requirements. Full information and catalogues will be mailed upon request. In addition to their general office and works at Aurora The American Well Works have an office at Chicago in the First National Bank Building.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Dundas, Ont.

Tenders are called until May 4th for the laying of cement sidewalks, to cost $8,000. Plans and specifications may be seen at the office of J. S. Fry, Town Clerk, Dundas.

Exeter, Ont.

Tenders will be received by the clerk until May 10th for the following: 3000 feet of 12 inch, 15 inch and 18 inch vitrified sewer pipe and specials. Plans, specifications and forms of tender at the office of either the clerk or the engineer. Lowest or any tender not necessarily accepted. Engineer, F. W. Farncomb, London, Ont. Clerk, T. B. Carling.

Fergus, Ont.

By-law was carried to provide $35,000 for waterworks and contracts will be let at once.

Hamilton, Ont.

The City Council are considering the advisability of laying asphalt and creosote roads. A report is being made by City Engineer. Estimated cost $13,500. Engineer, A. S. MacCallum.

Middleton, N.S.

The town will require about 1,500 ft. 24-in. sewer pipe and 500 ft. 18-in. pipe. Tenders will be called shortly. Specifications and plans may be seen at the office of J. A. Gates, Town Clerk. Chairman of Sewerage Committee, E. E. Bentley. Estimated cost $4,000.

Moose Jaw, Sask.

Tenders will be received by Commissioners until noon, May 15th, 1912, for laying of 34,000 sq. yds. of pavement. Plans and specifications at engineer's office. Lowest or any tender not necessarily accepted. Engineer, J. Antonisen.

North Battleford, Sask.

Tenders will be received by Sec.-treas. on the date specified against the respective works for the following: Contract "a"—Labor laying water mains and sewers (Apr. 30th). Contract "b"—Construction of power house (Apr. 30th). Contract "h"—Furnishing and an electric boiler (May 15th). Contract "j"—Furnishing and erecting 750 h.p. steam engine and accessories (May 15th). Contract "k"—Furnishing and erecting 500 kw. generator and equipment (May 15). Contract "t"—Constructing sidewalks (Apr. 22nd). Plans and specifications may be seen at the office of the engineers, Toronto and Winnipeg, and at the town hall, N. Battleford. Mayor, J. Griese. Secretary-treasurer, H. W. Dixon. Engineer, Chipman & Power, Mail Bldg., Toronto.

Toronto, Ont.

Tenders will be received by chairman Bd. of Control until noon May 14th 1912, for the following sewer work: Tile pipe 12-in. and 18-in., Walpole st. Greenwood avenue to E.S. of Redwood. McKinley street—Tyrrell street to Benson, Ossington—Davenport to St. Clair and the lane 1st west of Spadina, Oxford to Nassau and Belleview to College. Plans and specifications may be seen at Engineer's office, City Hall. J. D. Shields, Chairman Board of Control. Mayor Geary.

Tenders are called for road making on Innis avenue from McRoberts avenue to G. T. R. Received by Chairman Board of Control. Engineer in Charge, C. H. Rust, City Hall.

Tenders are called for bitulithic pavement on Glen Road, from East Roxborough street to Summerhill avenue. Concrete foundation, with concrete gutters. Received by Chairman Board of Control. Engineer in Charge, C. H. Rust, City Hall.

Tenders are called for tile pipe on Laughton avenue. Pipe 15-in., 1180 ft., 2 manholes 90 (6 ft. x 15 ft.) connections 8 (9 ft. x 15 ft.) culvert connections, and also on Talbot street 472 ft. 12-in. pipe, 2 manholes 36 (6 ft. x 12 ft.) p.d. connections 4 (9 ft. x 12 ft.). Engineer, C. H. Rust, City Hall.

Tenders are called for paving on Boultbee avenue; 700 ft. 4-in. concrete foundations. Received by Chairman Bd. of Control. Also for medium asphalt paving with concrete gutters on Beamish avenue. Engineer in charge, C. H. Rust, City Hall.

Township of North Easthope, Ont. . . .

Tenders are called for drain. Clerk, J. D. Fisher, Amulree P.O. Plans and specifications at Clerk's office or Jno. Rogers office, Mitchell, Ont. Deposit of $200.00 required. Lowest or any tender not necessarily accepted. Received by clerk, close May 6, 1912.

Windsor, Ont.

The Engineer, Mr. Bryan, will take up the matter of laying sidewalks and pavements on about twenty streets. If council passes by-law the work will be gone on with immediately

CONTRACTS AWARDED

Edmonton, Ont.

Contract is awarded for paving to cost $160,000. Engineer, Latournell, Edmonton. General contractor, W. Manders & Co., Winnipeg. 4½ miles of paving 20 ft. wide.

Sandwich, Ont.

Millard Warner has been awarded the contract for the construction of 15,000 ft. of sidewalk and crossings, cement and other materials required.

Toronto, Ont.

Contract is awarded for Dredging to cost $12,000, Hanlon's Point, for Dominion Government. General contractor, Gen. Construction & Dredging Co., Toronto. Tender price 15c. per cu. yd.

Contract is awarded for sinking wells to cost $5,000 on Centre Island, to Contractor John Harvey, City Engineer's Department. Information is asked for by the Board of Works, Toronto.

Westmount, Que.

Contract is awarded for sewers to cost $25,596. Contractors, R. G. Smith & Co. Sewers on Western avenue, Mountain avenue and the Boulevard. 850 2 x 3 lineal ft. of oval concrete pipe required.

Windsor, Ont.

Contract is awarded for waterworks extension to cost $32,400. Clerk, J. G Gelbert. General contractor, W. J. Dupuis & Co., Detroit, Mich. Also John Inglis & Co., Toronto, Ont.

Winnipeg, Man.

Contract is awarded for pumping plant, Garwood avenue, for Canadian Northern Railway. Architect, R. B. Pratt, Union Depot, Winnipeg. General contractor, National Construction Co. Donalda Building, Winnipeg.

Contracts are awarded for road materials. Engineer, H. N. Ruttan, 223 James avenue. Contractor, Alloway & Champion, Winnipeg, for Ebano Mexican Asphalt and 77 tons of fluxing, supplied by the Asphalt & Supply Co., Montreal. The Canadian Mineral Rubber Co. of Toronto received contract for twelve to fifteen hundred tons of asphalt cement.

Westboro, Ont.

General contractor, Thos. Jagger, Westboro, has been awarded the contract for 1½ miles of concrete walks. Engineers, Patterson & Byrne, Ottawa Secretary, R. F. Crain.

Railroads, Bridges and Wharves

Berlin, Ont.

Tenders will be received by clerk until noon, May 2nd, 1912, for construction of reinforced concrete bridge, span 16 feet, width 60 feet. Plans and specifications at town engineer's office Clerk, A. H. Miller.

Montreal, Que.

Cedar Rapids Mfg. & Power Co. have called tenders for construction of dyke and part of a power house near Montreal. Cost to be about $2,000,000.

Morris Township, Ont.

Tenders will be received by clerk until May 27th for the following: 2 cement culverts, each 15 ft. long; I-beams, reinforced floors, gas pipe railing. The above work to be on the Murry Lamb drain, and another of the same construction 6 ft. long on the Nichol drain. Clerk, A. MacEwan, Brussels, Ont. The ratepayers are to vote on a by-law in May to spend $23,000 to build steel and concrete bridges to replace those swept away in recent floods

Orangeville, Ont.

Tenders will be received by the clerk until [illegible] May [illegible]

[illegible] for the following: 1—price per cu. yd. for concrete in the completed work. Price per cu. yd. for concrete to cover work or removing old structure, doing all necessary excavating, filling, and construction of roadway between wing walls. 2—A lump sum for the steel reinforcing, complete. 3—A lump sum for the gas pipe railing, complete. Plans and specifications may be seen at Mayor's office. Clerk, A. A. Hughson.

Red Deer, Alta.

Plans are being prepared for reinforced concrete bridge to cost $5,500, Gaety avenue S. Architects, Dawe & Seymour. Sec.-treas., A. T. Stephenson. Mayor, [illegible]

Township Southwold, Ont.

Plans are being prepared for bridge with reinforced concrete abutments at Felton Bridge. Plans and specifications may be seen at office of engineer. Reeve, R. J. Henderson, Fingal, Ont. Engineer, J. A. Bell & Son, St. Thomas.

CONTRACTS AWARDED

Chatham, Ont.

Contract is awarded for steel bridge to cost $5,000, for Canadian Pacific railway to the Hamilton Bridge Company of Hamilton, Ont.

Work is in progress for freight sheds to cost $40,000, for Canadian Pacific Ry. 40 x 300, reinforced concrete and fire proof material will be used.

East Chezzetcook, N.S. (Halifax Co.)

Contract is awarded for the construction of breakwater to General Contractor, A. W. Girroir & K. Sweet, Antigonish, N.S. Dept. of Public Works, Ottawa. Secretary, R. C. Desrochers.

Pleasant Hill Road, N.B.

Contract is awarded for Dominion Government wharf. Contractor, F. L. Boone, St. Marys Ferry, N.B. Tender price, $3,792.

Ste. Luce, Que.

Contract is awarded for construction of wharf, Rimouski County. General contractor, Nap. Trudel, St. Irenee, Que. Dept. of Public Works, Ottawa. Secretary, R. C. Desrochers, Ottawa.

Upper Salmon River, N.B.

Contract is awarded for construction of a pier for Dominion Government. General contractor, W. & O. Downey, Curryville, N. B. Tender price, $5,386.

Walkerton, Ont.

Contract is awarded for bridge building to cost $45,000, for Canadian Pacific Railway. General contractor, The Hamilton Bridge Co., Hamilton. The steel bridge which was washed away by floods at Walkerton will be replaced by a modern structure.

Winnipeg, Man.

Contract is awarded for sub-station to cost $11,000 at Garson Quarries. Engineer, J. G. Glassco, 54 King street, Winnipeg. Contractor, Lyall Mitchell & Co., 389 Main street. 2-sty., concrete foundation, brick, reinforced concrete, steel, steam heating, electric light, etc.

Public Buildings, Churches, Schools, etc.

Arkona, Ont.

Tenders will be received by secretary until May 10th for the erection of a new church for The Arkona Baptist Church Board. Secretary, R. C. Cranford. W. Herbert George, architect, Castle Bldg.

Brantford, Ont.

Tenders are called for Tubercular hospital, Mt. Pleasant Rd., for Brantford Sanitorium. Chairman of Finance, A. E. Watts, K.C. Architect, Chapman & McGiffin, 59 Yonge street, Toronto. Stone and concrete foundation, brick construction, electric lighting, steam htg., gravel, gal. iron rfg. Building—Main part 35 x 48, 2½ storeys. Rear part, 18 x 53, 1 storey. 2 wings in front 18 x 53, 1 storey. Sand lime brick. Roof, gravel and gal. iron in asbestos. Floors and stairs, reinforced concrete. All but 2 front wings fireproof. Heating, steam, single pipe connected with vacuum air line system. 1 No. 937 Gurney steam boiler. 40 radiators, Gurney Oxford make. Plumbing modern. Estimated cost: General contract, $15,000; plumbing, $2,500; heating, $1,500; electric wiring and lighting, $1,000. Total $20,000.

Coboconk, Ont.

Tenders will be received by T. G. Birchard, Sec. School Board, until May 15th inclusive for a two-roomed school, solid brick, stone foundation, hot air heating, basement, playroom, teachers' rooms, sanitary closets, modern equipment in every detail. Plans and specifications may be seen at the Victoria Loan Company Building, Lindsay, Ont.

Collingwood, Ont.

The Dominion Government, Ottawa, will shortly call for tenders for construction of fish hatcheries, cement foundation and reinforced concrete vats, balloon construction. Estimated cost $20,000. Architect, P. C. Palin.

Tenders will be called for post office and customs warehouse for Dominion Government, Dept. of Interior. Architect, P. C. Palin, Collingwood. Estimated cost $60,000. Building to be stone and concrete.

Chatham, Ont.

St. Joseph Hospital Board are contemplating an addition of 3 storeys and basement, 45 x 90, to their present bldg. on King street west.

Clifford, Ont.

Work has started on erection of a school to cost $10,000. Secretary, R. J. Scott, Clifford. 2-sty., stone foundation, brick construction, hot air or steam heating, shingle roof.

Elora, Ont.

Tenders will be received by Mr. Mills until May 3rd for the following school fittings: metal ceilings, hardwood flooring, and one supporting timber with cap and iron column. Lowest or any tender not necessarily accepted. Secretary, Jno. A. Mills. Chairman, C. W. Stockford.

Essex, Ont.

Orange Lodge are contemplating the erection of a new hall on Centre and Alice streets to cost $7,000. 2-sty., 24 x 45, stone foundation, brick construction, electric lighting, heated by furnace.

Hamilton, Ont.

Gospel Tabernacle Congregation, pastor P. W. Philpott, Mountain avenue, are contemplating the erection of a new church on Trolley street to cost $20,000.

Plans are prepared for a church to cost $20,000, Ottawa street, for Presbyterian Church Board. Chairman, James Chisholm of Chisholm & Logie, barristers, St. James street south. Architect, Stewart McPhie, Bank of Hamilton Bldg. Tenders will be called for in about two weeks.

Melville, Sask.

A by-law has been passed by the ratepayers for the purpose of raising funds to build Town Hall. Brick and stone construction. Plans have been prepared by Storey & VanEgmond, of Regina.

North Gower, Ont.

Plans are in preparation for school to cost $7,000. Architect, W. Herbert George, Castle Bldg. Concrete foundation, cement block and metal construction, metal roofing.

Orangeville, Ont.

Tenders will be received by Secretary for refitting hospital until May 8th, for the following:—1.—A complete hot water system. 2.—Plumbing for same. 3.—Painting interior of building. Tenders will be received in bulk or separately. Lowest or any tender not necessarily accepted. Address Mrs. Dahl.

Port Colborne, Ont.

The Port Colborne School Board are contemplating the erection of a new school to cost $10,000. 4 rooms, brick construction, shingle roofing, modern in every detail. For further information write secretary of School Board.

Stratford, Ont.

The Lutheran Church, Pastor, Rev. Mr. Boese, plan to erect a new edifice at a cost of $7,000. Two-stys., stone foundation, brick construction, hot air heating, electric lighting, complete new equipment required.

Saskatoon, Sask.

The city council is contemplating building public swimming baths at a cost of $25,000 and are asking for information on the subject.

The Board of Health of Saskatoon are contemplating three hospital buildings for infectious diseases. Cost $10,000.

Knox Presbyterian Church have had plans prepared by Architects Brown & Vallance, Montreal, for the erection of a new church on Spadina avenue to cost $150,000.

Toronto, Ont.

The Fire Department is contemplating the building of a fire hall at the corner of St. Clair and Hendrick streets, Toronto, and have also purchased a site on Greenwood avenue for $25,000, upon which a smaller hall will be built. Chief, J. Thompson. Secretary, R. J. McGowan. Architect, City architect.

The site has been purchased at the corner of Roncesvalles and Wright ave. for a fire hall at an approximate cost of $25,000. Chief, J. Thompson. Secretary, R. J. McGowan. City Architect is in charge.

Plans are being prepared for a public bathhouse to cost $30,000, Sackville street south. 2-sty., 52 x 165, brick foundation, brick construction, reinforced concrete, showers and a number of individual showers. City architect has the plans.

Westmount, Que.

The Westmount Protestant School Commissioners have bought the City Hall and fire station to be made into an annex to the academy adjoining. Commissioners also contemplate erecting a large high school.

The town has sold city hall with combined fire and police station for $80,000 and will erect new buildings with all modern equipment.

Winnipeg, Man.

Tenders are called until May 3rd for stable and carriage shed to cost $25,000. at City yards. Architect, H. N. Ruttan. Buildings to be solid brick.

Windsor, Ont.

Masonic Temple Association will hold a meeting to decide whether they will add two storeys more to the proposed temple. This would make a six-storey building at a cost of $30,000.

The Masonic Association plan to erect a new hall on London street at a cost of $90,000. Five storeys, 100 x 92, pressed brick construction, stone foundation, electric light, gravel roofing. Elevators and complete interior equipment required. President, Goldwin English. Architect, Crane & Pennington, Windsor.

CONTRACTS AWARDED

Aylmer, Que.

Contract is awarded for stands and pavilions to cost $65,000, for Ottawa Racing Association. President, J. K. Paisley, Grand Union Hotel, Ottawa. Architect, W. H. George, Castle Building, Ottawa. Carpentry, A. Christie, 359 Elgin street, Ottawa. Painting and glazing, A. J. Marshall, Bank street. Roofing, Capital Roofing Co., Bank of Ottawa. Steel and concrete for stands, pavilion frames, J. Manville Asbestos roofing.

Hamilton, Ont.

Contract is awardd for church, cost $50,000, on Main street east, for St. Giles Presbyterians. Architects, Stewart & Witton, 2 Hughson street south. Gen. Contractor, masonry, R. Tope, 191 Robinson street. Carpentry, Stewart Bros., 1 Hyde Park avenue. Roofing, Dennis & Jocelyn, 1317 Walnut street. Plastering, Hannaford Bros., 232 Robinson St.

Church to cost $30,000, Main street, between Spring and Ferguson avenue, for Congregational Church. Architect, S. McPhie, Bank of Hamilton Bldg. Contractor, Geo. E. Mills, 614 King street east.

Lachine, Que.

Dance hall, theatre and bowling alley to cost $15,000, 9th avenue and Notre Dame street, for A. Coldwater, Lachine Locks. Architect, W. J. McGregor, 5 Beaver Hall Sq., Montreal. General contractor, H. J. Norton, 11th avenue, Lachine. 3-sty., 50 x 87, brick construction, concrete foundation, electric light, hot water heating, gravel roofing.

Medicine Hat, Alta.

Church to cost [illegible], for St. Barnabas Anglican Congregation, Medicine Hat. Architect, J. Teague, Calgary. Contractor, Lussier Construction Company, Medicine Hat, Alta. 74 x 120, cement and concrete, basement, brick and tile walls, bell tower finished, cut [illegible] electric light, Maple Gothic architecture, [illegible] supported on Gothic [illegible]

Maisonneuve, Que.

Contract is awarded for school to cost $150,000, for Maisonneuve R. C. School Board. Architect, C. A. Reeves, 58 James street, Montreal. Mason contractor, E. D. Tressier, 270 W. David St. Painting, M. Lecavalier, Maisonneuve. Ironwork, Phoenix Bridge & Iron Co., Mtl. Roofing, R. H. Larin, 203 1st ave. Maisonneuve. Carpenter, A. Marchessault, 207 Desjardins street, Mtl. Stonework, J. Dausereau, Maisonneuve. Brickwork, A. Gratton, 138 3rd avenue, Viauville.

Mildmay, Ont.

Herman Beeker of Walkerton and Jos. Schnurr of Mildmay have been awarded contract for masonry work required for the erection of the Catholic Church here to cost $40,000.

Montreal, Que.

Contract is awarded for lodge rooms on Sherbrooke street, for Royal Guardians, 227 Sherbrooke street. Architect, MacVicar & Heriot. Masonry, Reid, McGregor & Reid, 14 Guy Block. Carpenter, Wm. Evely, 449 Bleury st., Mtl. Painting and glazing, C. O'Brien, 75 Almer street. Plumbing and heating, Staton & Bowell, 2554 Mance. Ironwork, Phoenix Bridge & Iron Wks., Ltd., 83 Colborne street. Roofing, G. Reed & Co., Ltd., 37 St. Antoine street. Electric wiring, Collyer & Brock, 131 St. Alexander street. Plastering, R. G. Hamilton, 515 Victoria avenue, Westmount. Building to be of stone construction.

North Battleford, Sask.

Board of Trade Building to cost $3,500, King street. Architect, Stephenson & Evans, N. Battleford. General contractor, Broley & Co. 1-sty., 32-ft. drain (octagonal) concrete foundation, frame construction, shingle roofing, steam htg. electric lighting.

Toronto, Ont.

Contract is awarded for fire hall and police station, cost $17,613, at Toronto Exhibition. Architect, G. W. Gouinlock, Temple Building, Toronto. General contractor, J. Sim, 372 Markham Street, Toronto. One storey, 90 x 90, brick construction, stone foundation, electric lighting, gravel roofing, concrete finish.

Victoriaville, Que.

Contract is awarded for city hall to cost $20,500. Architect, J. W. Gugone, Sherbrooke. General contractor, Laplante & Co. 3-sty., 50 x 76, stone foundation, brick construction, steam heating, electric lighting, gravel roofing, wood finish.

Winnipeg, Man.

Contract is awarded for S. S. Club House to cost $40,000, for Holy Trinity Church. Architect, D. W. Bellhouse. Contractor, Aird-Lewis Co., [illegible] steam heating, electric lighting, asbestos and slate roofing, fir floors.

Residences

Calgary, Alta.

Plans are ready for residence to cost $3,500 for G. J. Winn. 2-storey, 18 x 36, concrete foundation, frame construction, hot air heating, shingle roofing , hardwood floor.

Courtland, Ont.

Geo. Troyer will build a new residence, cost [illegible]

fndn., brick construction, electric lighting. Plans will be prepared shortly.

Kincardine, Ont.

Samuel Farrell will build a new residence to cost $3,000, Huron Terrace street. 2½-sty., 28 x 40, concrete foundation, brick construction, electric ltg.

London, Ont.

Tenders wanted for apartment house. Plans and specifications may be seen at A. J. Denny's, 610 Dundas street, London, Ont.

Montague, Que.

Plans are in preparation for bungalows to cost $6,000, for Canadian & Gulf Terminal Railroad Co. Architect, W. Herbert George, Castle Bldg. Frame buildings with shingle roof.

Ottawa, Ont.

R. H. Miller is contemplating the erection of a six storey apartment house on Nepean street, and plans are being prepared.

Plans are ready for residence to cost $4,500, Powell avenue, for M. Korn, 344 Bell street, Ottawa. 3-sty., 44 x 34, stone foundation, brick veneer, hot air heating, electric light, shingle roofing.

Plans are being prepared for 2 residences to cost $10,000, 1st avenue, for Mr. Hunter. Architect, W. Herbert George, Castle Bldg., Ottawa. 3-sty., stone foundation, brick veneer construction, hot water heating, electric lighting, shingle roofing.

Plans are prepared for residence to cost $3,000, Crichton avenue, for W. C. Neal, 35 Sussex street, Ottawa. Brick veneer construction, 22 x 27.

Saskatoon, Sask.

Plans are ready for 2 residences on Albert avenue for T. C. Beattie, Saskatoon. Frame construction, concrete foundation, hot air heating, electric ltg., B.C. shingle roofing.

Plans are ready for residence to cost $4,000, Avenue G., for Martin Daley, Saskatoon. 2-sty., frame construction, concrete foundation, vacuum steam htg., electric lighting, shingle roofing, oak finish.

Plans are being prepared for parsonage to cost $5,000 for Trinity German Lutheran Church. Architect, C. W. Bergenhagen, Sask. 2-storey, frame construction, concrete foundation, vacuum steam heating, electric light, B. C. shingle roofing, oak finish.

Plans are ready for residence to cost $4,000, Avenue E., for Wm. Armstrong, Saskatoon. 2-storey, stone foundation, frame construction, vacuum steam heating, electric light, shingle roofing, oak and fir flooring.

Plans are ready for residence to cost $3,500, 29th street, for Geo. Pinder. [illegible] vacuum steam heating, electric light, [illegible]

Sherbrooke, Que.

A. W. Tracey, Sherbrooke, will build a new house to cost $3,500. 2-sty., 27 x [illegible] construction, hot air heating, shingle roofing, electric lighting, wood finish [illegible]

Thamesford, Ont.

Albert Carter is planning to erect a [illegible] was destroyed by fire and new one will be built to replace it.

Toronto, Ont.

Plans are ready for residence to cost $[illegible] on Quebec avenue, for W. E. McGill, 88 Quebec avenue. Architect, Ellis & Connery. 2-storey, brick, shingle roofing, hot water heating, electric and gas [illegible] structural steel, hardwood finish and floors, laundry tubs.

Plans are ready for 3 residences to cost $[illegible], Balmoral Avenue, near Yonge, for W. G. & Jas. Bell, 160 Roxton road. Owner is builder and architect. 2-storey and attic, 50 x 110, shingle roofing, hot air heating, electric ltg., mantles, hardwood floors.

Plans are ready for apartments to cost $12,000, Beech avenue, for J. Irving, 1516 King street west. Architect, E. R. Conlan, 802 Lumsden. 2-storey, brick, semi-detached, felt and gravel roofing, electric light, tiles, hardwood finish.

Plans are ready for residence to cost $6,000, High Park Blvd., for E. P. Atkinson, 100 Roncesvalles avenue. Architect, J. H. Galloway, 23 Toronto street. 2-sty. and attic, 50 x 140, shingle roofing., hot air heating, electric lighting, mantles, hardwood finish.

Plans have been prepared for 4 dwellings to cost $10,000, 56-60 Alcorn ave., for J. M. Cowan, (in trust) 65 Adelaide E. Architect is owner. 2-sty., shingle, felt and gravel rfg., hot air htg., electric lighting.

Griffith & Co., 65 Adelaide street are contemplating the erection of apartments on Dundas street and Beaconsfield avenue to cost $15,000. 3-storey, brick, stone foundation, felt and gravel roofing. Architect, J. M. Cowan.

Tenders are open for apartments on Harbord and Palmerston avenue for Mr. Ryan. Architect, A. J. Rattray, Stair Bldg. Felt and gravel roofing, steam heating, gas and electric lighting, vacuum system, hardwood finish. Masonry and concrete let but other trades are still open.

Foundation is in for 2 residences to cost $5,200, Thorold street, for A. H. Cassevoy, 200 Howard Park avenue. Architect, J. M. Cowan, 65 Adelaide East. 2½-sty., shingle roofing, hot air heating, electric and gas.

S. J. McClelland, 27 Fairview Blvd., will build a residence to cost $4,600, on Garnock avenue. Architect, D. J. Isaac, 5 Columbus street. 2-storey, hot air heating, electric lighting, mantles, hardwood finish, shingle roofing.

Work will start shortly on a residence on Bathurst north of St. Clair for Mrs. M. J. Miller, 84 Cromaley avenue. Engineer, A. R. Phillips, c/o D. Schawlin, 799 St. Clair avenue west. 2½-sty., brick, slate roofing, hot water heating, gas and electric light, hardwood floors, concrete, art glass, tile floor in bath rooms and tile hearths.

Plans are ready for apartments to cost $5,000, on Boustead avenue for G. E. Webb, 35 Lynd avenue. Architect, J. M. Cowan, 65 Adelaide street. 2-sty., brick, stone foundation, hot water htg., electric lighting, mantles, structural steel, hardwood finish, felt and gravel roofing, plate glass.

Tenders are open for dwelling to cost $4,500, Ridout St., for J. Prentiss, 132 Havelock street. Architect, J. H. Galloway, 23 Toronto street. 2-sty and attic, 50 x 150, hot water heating, electric lighting, slate roofing, mantles, hardwood finish.

Tenders are open for residence to cost $4,500, Ridout street, for J. E. Moir. Architect, J. H. Galloway, 23 Toronto street. 2-storey and attic, 50 x 150, slate roofing, hot water heating, electric ltg., mantles, hardwood finish.

Windsor, Ont.

E. F. Davey is building 5 residences to cost $20,000, on Langlois street. 1½-sty., stone foundation, brick and frame construction, shingle and slate roofing.

Osterhout & Little contemplate building 20 residences to cost $60,000. 1½-sty. and 2 sty., stone foundation, brick construction, stucco finish, slate and shingle roofing, electric light.

A. T. Curral is planning to erect apartments to cost $12,000, Pellessier street. Architect, Crane & Pennington, Windsor. 4-storey, 25 x 35, stone foundation, brick construction, steam heating, electric lighting.

Work has started on residence to cost $3,000, on Moy avenue, for A. Campbell. 1½-storey, 28 x 40, brick veneer construction, cement foundation, electric light, shingle roofing.

Winnipeg, Man.

Tenders are called for residence for A. J. Long. Architect, Frank R. Evans, 506 Somerset Block. 2½-sty., 40 x 40, stone foundation, brick and stone construction, hot water heating, electric light, shingle roofing, hardwood floors. Received by architect until May 6, 1912.

CONTRACTS AWARDED

Calgary, Alta.

Contract is awarded for 2 residences to cost $4,000 each, for J. Robertson. General contractor, A. M. Mitchell. 1-storey, 20 x 40, frame construction, shingle roofing.

Plans are ready for 2 residences to cost $6,000, Royal Sunalta, for J. Thomas, 11 Victoria Blk. Architect, Burroughs & Richards. General contractor, owner. 2-storey, 19 x 36, frame construction, concrete foundation, hot air heating, electric light, shingle roofing, hardwood finish.

Plans ready for residence to cost $5,000 for Alliance & Investment Co., 711 1st street west. Contractors are owners. 2-storey, 28 ft. 3 in. x 45 ft. 6 in., concrete foundation, frame construction, shingle roofing, hot air heating, electric lighting.

Residence to cost $5,500, Mt. Royal, for A. J. McWilliams, 18th avenue west, Calgary. General contractor, D. McLaws, 801 13th avenue west. 2-storey, 30 x 35, frame construction, concrete foundation, hot water heating, electric light, shingle roofing.

Residence to cost $4,500, 13th avenue west, for J. R. Henderson, 1037 11th ave. W. Gen. contractor is owner. 2-storey, 25 x 38, brick veneer, concrete foundation, steam heating, electric lighting, shingle roofing, hardwood finish.

Plans are ready for 2 residences to cost $6,000, for J. H. Garden, 110 Garden Crescent. Architect is owner and builder. 2-sty., 22 x 36, concrete foundation, frame construction, electric lighting, hot air heating, shingle roofing, hardwood floors.

Plans are ready for residence to cost $4,500, Elbow Park, for J. S. Crozier, 336 15th avenue E., Calgary. Contractor is owner. 2-storey, 24 x 36, frame construction, concrete foundation, hot air heating, electric lighting, shingle roofing, hardwood finish.

Calgary East, Alta.

Residence to cost $4,000, for J. Stokes, 517 6th ave. east. General contractor, Mr. Steadman, 1522 13th ave. east. Two storeys, 34 x 30, brick veneer, concrete foundation, hot air heating, electric light, shingle roofing.

Hamilton, Ont.

Residence to cost $15,000, Queen st., for R. Moodie, Queen street, Hamilton. Architect, S. McPhie, Bank of Hamilton Bldg. Mason work, R. Tope & Son, 191 Robinson street. Carpenter, L. J. Beatty, 169 Locks street. Plastering, J. Glapham & Son, 14 Main street. Painting, Goodale & Laidlaw, 20 Hunter st. E. Galv. iron work, J. B. Riddell, 12 Ferguson avenue. Plumbing, J. H. Stewart, 14 John street north. Electric wiring, Electric Supply Co., 67 James street. Tile, Kent, Garvin Co., King street. Drains, J. J. Armstrong, 48 Burris street. Weather strip, Wm. Peace Co., Bank of Hamilton Bldg.

Lachine, Que.

Residence to cost $3,500, 17th avenue, for R. Brunet, 99 15th avenue. Architect, J. D. Viau, St. Gabriel street. Gen. contractor, A. Laplante, Lachine Locks. 2-storey, 32 x 35, brick construction, stone foundation.

Montreal, Que.

Work has started on the erection of flats, to cost $6,000, for F. Tremblay, Guy and William streets. Architect, R. Charbonneau, 15 St. James street, Montreal. Contractor is owner. Three stys., 30 x 90, concrete foundation, stone front, mill construction, hot water heating, gas and electric lighting, gravel rfg.

Work has started on the erection of six flats, cost $13,000, St. Hubert street, for Ouellete & Blanchet, 996 St. Catharines street east. Contractor is owner. Three storeys, 50 x 110, concrete foundation, brick and stone construction, hot water heating, electric light, gravel rfg.

Work has started on erection of flats to cost $6,000, Garnier street, for Peter Lateudresse, 559 Rivard street. Contractor is owner. 3-storey, 32 x 60, stone foundation, brick encased, electric lighting, gravel roofing.

Flats to cost $5,000 for T. Bourassa, 1056 Dorin street. Contractor, J. Vail-loncourt, 692 Papineau avenue. 3-sty., 30 x 52, concrete foundation, brick construction, gas and electric lighting, gravel roofing.

Residence to cost $4,500, Jeanne Mauce, for C. O. Lamontagne, 29 Jeanne Mauce. Architect, J. A. Mercier, 170 St. Andre. General contractor, H. Gravel, 53 St. Denis street. 44 ft. high, 23 x 34, brick encased, stone foundation, gravel roofing.

Two flats to cost $6,250, Chapleau st., for R. Tourangeau, 408 Gertrude street. Architect, R. Charbonneau, 15 St. James street. General contractor, V. Saurotte, 408 Gertrude street. 2-storey, 25 x 78, pressed brick construction, concrete foundation, gas lighting, gravel roofing.

Work has started on 2 residences to cost $6,000, 223 Montcalm avenue, for O. Carriere, 123a Amherst street. Owner is architect and builder. 3-storey, 42 x 46, stone foundation, brick encased, gas and electric lighting, tar and gravel roof.

Two residences to cost $9,000, Belgrave avenue, for D. Keene, 110 Mance street. Architect, J. W. McGregor, 5 Beaver Hall Hill, Montreal. General contractor, Jno. Ford, 146 Galt avenue, Verdun. 2-storey, 25 x 45, concrete foundation, pressed brick, hot air heating, electric light, gravel roofing.

North Battleford, Sask.

Contract is awarded for erection of a tenement house. Architect, Stephenson & Evans, N. Battleford. General contractor, Broley & Co. 3-storey, 85 x 30, frame and concrete construction, electric lighting, hot water heating, shingle roofing.

Ottawa, Ont.

Residence to cost $9,000, Clemow ave. for Mayor Chas. Hopewell, City Hall. Architect, W. E. Noffke, Elgin street. Contractor, John Robertson, Ottawa. 2½-sty., 34 x 40, stone foundation, pressed brick construction, hot water heating, electric lighting, shingle roofing.

Contract is awarded for residence to cost $7,000, New Edinburgh street, for J. Lumsden, N. E. Ottawa. Architect, W. E. Noffke, Elgin street. Masonry, A. Lobey. Electricity, J. A. Ellacott. Carpenter, Ferguson & Lambert. Painting and glazing, Wm. Howe. Plumbing and heating, H. A. Knox. Plasterer, F. Hunt. Stone foundation, solid brick construction, electric lighting.

Plans are ready for residence to cost $4,500, Adelaide street, for Thos. Cleary, 111 Centre street, Ottawa. General contractor is owner. 50 x 30, stone foundation, brick veneer construction, electric light, gravel roof.

Plans are ready for residence to cost $4,000, St. Patrick street, for A. Sugamann, 480 St. Patrick street. General contractor is owner. 2-storey, concrete foundation, brick veneer construction, gravel roof, hot air heating, electric light.

Residence to cost $5,000, Woodlawn avenue, for James T. Watt. General contractor, R. McKingsley. 3-storey, 25 x 48, stone foundation, brick veneer construction, electric light, shingle roofing, hot water heating.

Outremont, Que.

Work has started on cottage to cost $10,000, Maplewood avenue, for L. Dausereau, 1071 Mount Royal avenue. Gen. contractor is owner. 2½-sty., 37 x 46, concrete faced with brick construction, concrete foundation, hot water heating, electric and gas lighting, concrete roofing, marbleoid floor.

Work has started on 3 cottages to cost $15,000, De l' Epee street, for Arthur Poissant, 1158 St. Viateur street. General contractor, P. E. Rouillier, 2108 Waverley street. 2-storey, 78 x 40, pressed brick construction, stone foundation, hot water heating, gas and electric light, tar and gravel roofing.

Work has started on residence to cost $9,000 on Outremont avenue, for J. H. Lamarche, 364 De l' Espee avenue. Architect, R. Charbonneau, 15 St. James st. General contractor is owner. 2-storey, 31 x 65, stone construction, masonry foundation, hot water heating, electric lighting, tar and gravel roofing, copper cornices.

Residence to cost $10,000, for Arthur Brossard, 2129 Park avenue. Architect, A. H. Lapierre, 30 St. James street. Gen. contractor, M. Huberdean, 633 Demontigny. 2-storey, 36 x 56, stone foundation, brick and stone construction, hot water heating, electric lighting, tar and gravel roofing, galvanized iron cornices.

Work has started on a cottage to cost $10,000, Bloomfield S., for Wilfred Bessette, 443 Durocher street. Architect, Gauther & Doaust, 180 St. James street. General contractor is owner. 2-storey and attic, 36 x 50, brick construction, stone foundation, hot air heating, electric light, tar and gravel roofing.

Paris, Ont.

Residence to cost $3,500, Water st., for Robt. Cale. General contractor, R. T. Chipman, 25 Edward street, Brantford, Ont. Heating contractor, W. H. Turnbull, 99 Colborne street, Brantford. 2-storey, 35 x 25, stone foundation, brick construction, electric lighting. Work will be started on July 15th.

Preston, Ont.

Contract is awarded for 2 residences to cost $9,000. General contractor, Schroeder & Roth, Preston, 1½ and 2-sty., brick construction, cement fndn., electric light.

Red Deer, Alta.

Contract is awarded for residence to cost $4,000, Park street, for G. H. Murrin. 1½-storey, 29½ x 28, concrete foundation, brick veneer construction, steam heating, electric lighting, shingle roofing.

Residence to cost $5,750, Highland Park, 1st street S.E., for Jno. Malcolm. General contractor, W. G. Houston, Red Deer. Plumbing and heating, Smith & Gaetz, Red Deer. 2-storey, 32 x 44, frame construction, concrete foundation, steam heating, electric lighting, shingle roofing, hardwood finish.

Sherbrooke, Que.

Tenement to cost $5,500, Gillespie St., for Joseph Ferchelle, Grand Union Hotel, Sherbrooke. General contractor, A. Joricas & Co., Sherbrooke. 3-storey, 40 x 58, stone foundation, brick encasing, gravel roofing, electric lighting, hardwood flooring.

Two residences to cost $7,000, Moore street, for J. St. Dues, Sherbrooke, Que. General contractor, A. Joncas & Co., Sherbrooke, Que. 3-storey, 40 x 60, stone foundation, brick veneer, steam heating, electric lighting, gravel roofing, hardwood floor.

Tavistock, Ont.

Residence to cost $3,500, Wellington street. Owner and contractor, Henry Roth. 1½-sty., 28 x 35, brick veneer construction, electric lighting.

Toronto, Ont.

The Building & Constructing Co., Ltd., 21 Adelaide street E., are excavating for residence to cost $6,500, 42 St. Andrews Garden. 2½-sty., brick, stone foundation, shingle roofing, hot water heating, electric light.

Plans are ready for residence and garage to cost $5,500, Avenue road and Lyndwood avenue, for W. S. Grimshaw, 90 Walker avenue. Architect, J. H. Galloway, 23 Toronto street. Builder is owner. 2½-sty., 66 x 132, stone, slate roofing, hot air heating, electric light, stucco.

Residence to cost $7,000, 312 Roxborough avenue, for W. T. Heaven. Architect, Designing & Draughting Co. Builder, W. B. Charlton, 140 Close avenue. 2½-storey, 50 x 135, brick, slate roofing, hot water heating, light, mantles, hardwood finish and floors.

Foundation has started on 2 residences to cost $6,000, Pauline avenue near Bloor, for B. J. Case, 55 Pauline ave. Owner is architect and builder. 3-sty., 33 x 43, brick, stone foundation, slate roofing, hot air heating, electric light, mantles and tiles, hardwood finish and floors.

Plans are ready for 3 residences to cost $10,000, on Campbell avenue, for Knifton & Pountney, 118 Paton road. Architect, J. Pountney, 118 Paton. Owner is builder. 2-storey 2 pair semi-detached, 6 rooms, brick, shingle roofing, hot air heating, electric light.

Plans are ready for residence to cost $4,400, Rusholme Park Crescent, for G. S. Barber, 3 Awde street. Builder is architect. 2½-sty., 40 x 110, brick and stone, stone foundation, shingle roofing, hot air heating, electric light, hardwood floors.

Foundations are in for garage and residence to cost $4,000, 166 Geoffrey st. for W. McCabe, 30 Lynd avenue. Architect, S. S. Deforest. Builder is owner. Brick, stone foundation, shingle roofing, hot water heating, electric light, hardwood finish.

Plans are ready for residence to cost $8,000, Campbell avenue, for Chas. C. Fry, 36 Oakmount road. Owner is architect and builder. 2-storey, stone foundation, shingle roofing, hot air htg., electric light.

Alfred W. Reid, 104 Admiral road, contemplates building four apartment houses to cost $40,000, Castle Frank and Dale avenue. Owner is builder. 2-sty., brick, slate roofing, hot air heating, electric lighting, mantles, hardwood finish, fireproofing, metal lath, laundry tubs.

Roundell & Bartholomew, 360 Symington avenue, are excavating for residence to cost $6,600, Perth avenue west side. 2-storey and attic, brick, brick foundation, shingle roofing, hot air htg., electric light.

Foundations are in for 2 dwellings to cost $7,000, Keele near Bloor, for Architect and builder, J. Naylor & G. Reed, 234 Gilmore, 331 Roncesvalles avenue. 2½-sty. and attic, 50 x 150, stone foundation, hot air heating, shingle roofing, gas and electric lighting.

Residence to cost $18,842, Douglas drive, for Jos. Banigan, 199 Yonge st. Architect, Eden Smith & Son, 199 Yonge street. Builder, Fussell & Son, 199 Yonge street. 2-storey, brick, shingle roof, hot water heating, electric light, structural steel, art stone, hardwood finish, stucco, art glass, laundry tubs.

Residences to cost $8,000, Cumberland street, for Chas. Tyler (in trust), 20 Price street. Architect and builder, C. E. Tyler, 67 Scollard [illegible] 16 x [illegible] each, brick, shingle roofing, hot air heating, electric and gas lighting.

Plans are ready for apartments to cost $9,000, Foxbar road, for F. T. Smith, 37 Rosehill avenue. Architect, Designing & Draughting Co., 36 Toronto [illegible]

[illegible] 2-storey, brick, shingle, felt and gravel roofing, hot water heating, electric lighting, mantles, hardwood finish

Plans are ready for apartments to cost $4,300, Dufferin and Temple, for W. Grogan, 57 Hewitt avenue. Owner is architect and builder. 2-sty., brick, stone foundation, felt roofing, hot air heating, electric lighting.

Plans are ready for dwelling to cost $4,000, Garnock avenue, for W. E. McLaughlan, 24 Cheltenham. Builder is owner. 2½-sty., 50 x 40, solid brick, cement foundation, shingle, felt and gravel rfg., hot air heating, electric ltg.

Plans are drawn for 5 dwellings to cost $15,000 on Edgewood Crescent, for A. A. Kennedy, 36 Edgar avenue. Owner is architect and builder. Detached brick, shingle roofing, hot air heating, electric lighting, mantles.

Residence to cost $5,000, 79 Edgewood avenue, for Mrs. J. Hare, 79 Edgewood avenue. Builder, W. J. Robson, 325 Gladstone avenue. 2-sty., hot water heating, electric lighting, stucco, shingle roofing.

Plans are ready for residence to cost $6,500, High Park avenue, for C. F. Matthews, 788 Dundas street. Architect, A. J. Rattray, Stair Building. Builder, R. H. Harman & Son, 156 Dupont street. Brick, shingle roofing, hot water heating, gas and electric lighting, mantles and tiles, stucco, art glass.

Vancouver, B.C.

Apartments to cost $9,000, Cotton drive, for A. Yarcoe, 1330 Cotton Drive. Architect, The Vancouver Free Homes, Ltd. (T. Bamforth). Contractor, F. Townsend & Co., N. Vancouver. 8 suites, 58 x 50, frame construction.

Apartment house, 10th avenue, for D. B. Cummings, H. H. Watson, J. M. Atkins and J. N. Henderson. Contractor, H. L. Stevens, contracting and Engineering Co., Duncan Building. 3-sty., 100 x 120, brick and mill construction. To have 54 2 and 3-roomed suites, installed with disappearing beds. Full basement. Finishing to be in red pressed brick. Excavation now under way by Campbell Bros.

Westmount, Que.

Work has started on 8 residences to cost $48,000, Victoria avenue, for W. H. Creed, 686 Roslyn avenue. Contractor is owner and architect. 3-storey, 26 ft. 3 in. x 51 ft., concrete foundation, brick and concrete, hot water heating, electric light, tar and gravel roofing.

Work has started on 4 residences to cost $24,000 on Lansdowne avenue. Contractor, Isaac Collins, 207 Ash avenue. 3-sty., 25 x 52, concrete foundation, brick and concrete construction, hot water heating, electric lighting, flat roof.

Winnipeg, Man.

Residence to cost $12,500, Balmoral street, for W. Hill. Architect, W. W. Blair, Nanton Bldg. General contractor, A. B. Anderson, 114 Spence street. 2½-storey, 26 x 34, stone foundation, brick veneer construction, electric lighting, steam heating, shingle roofing, oak and maple floors.

Residence to cost $12,500, Balmoral street, for W. Hill. Architect, W. W. Blair, Nanton. Contractor, A. B. Anderson, 114 Spence street. 2½-sty., 26 x 34, brick veneer construction, stone foundation, steam heating, electric ltg., shingle roofing, oak and maple flooring.

Business Buildings and Industrial Plants

Berlin, Ont.

The Foster-Armstrong Piano Company contemplate building a new factory; 3-storey, 60 x 200. Cost $15,000.

Burlington, Ont.

Wm. Hamilton will build a flour and feed mill, cor. John and Pine streets. The excavation work is started. A solid brick building will be erected immediately and complete new machinery will be required.

Calgary, Alta.

The Canada Malting Co. have plans on the way for a new malting plant to be erected immediately. Architect, J. Stewart & Co., Chicago.

L. T. Memburn, 8th avenue west, is planning to erect a warehouse. Architect, Tyshe Mart & Co., Dominion Bank Bldg., Calgary. 3-sty., 50 x 130, brick construction.

Canning, N.S.

Cornwallis Trading Co. are planning to erect a new store at a cost of $4,000. 1½-sty., 60 x 30. cement foundation, cement construction.

Edmonton, Alta.

The G. T. R. are calling for tenders for the removal of buildings occupying the site on McDougal ave., where they plan to erect their new hotel. The supt. of hotel system, F. W. Bergman, Ottawa.

Tenders are called for warehouse for Campbell, Wilson & Horne. Architect, J. H. G. Russell. 5-sty. and basement, 50 x 137, brick mill, concrete foundation, steam heating, electric light, felt and gravel roofing, freight elevator wanted.

Hamilton, Ont.

Plans have been prepared for addition to factory to cost $5,000, for Canadian Meter Co. Manager, J. B. McNary. Caroline street N. Architect, Stewart McPhie, Bank of Hamilton Bldg. The addition will be chiefly of cement and foundation work.

London, Ont.

The McClary Mfg. Co., Mgr. Wm. Gartshore, London, plan to erect a new shop on York street. Four storeys, 40 x 100, stone foundation, brick construction, steam heating, electric lighting, gravel roofing, Tinworb will be carried on in building, new machinery presses will be required. Estimated cost $60,000.

Listowel, Ont.

Gunns Ltd. have purchased a site and will erect a shipping and storage warehouse. Cold storage systems required. Manager, P. Reddon.

Middleton, N.S.

The Co-operation Co. plan to construct an apple evaporator to cost $3,500. 2-sty., 50 x 35, stone foundation, brick construction, metal roofing.

Montague, Que.

Plans are being prepared for hotel to cost $12,000, for Canadian & Gulf Terminal Railway Co. Architect, W. Herbert George, Castle Bldg. Building to be of frame construction.

Niagara Falls, Ont.

A by-law has been passed by the city council to issue debentures for $3,000 to give the Pollard Company a free factory site.

Ottawa, Ont.

Plans are being prepared for stores and apartments to cost $4,000, Nepean street, for F. Forde, Bank street. Architect, W. Herbert George, Castle Bldg. 4-sty., stone foundation, solid brick, semi-fireproof construction, hot water heating, electric lighting, gravel roofing. Elevators will be installed.

Port Elgin, Ont.

Court Curtis will build an addition to horse collar factory. New machinery will be installed.

Prince Albert, Sask.

The McPherson Fruit Co., Winnipeg, Man., will erect a 3-sty. 50 x 120, modern retail warehouse here. Further information may be had from Manager McPherson Fruit Co., Saskatoon.

Sherbrooke, Que.

Tenders are called for store and offices, cost $70,000, on Wellington St., for Quebec Central Railway. Architect, Cox & Amos, 112 Mansfield street, Montreal. Three or four storeys, stone fndn. brick construction, stone trimmings, steam heating, electric lighting, gravel roofing.

Sandwich, Ont.

C. E. Naylor will erect a factory to cost $5,500. Plans are to be prepared at once. New machinery will be needed.

Saskatoon, Sask.

Work is in progress for extension to the Albany Hotel to cost $15,000, on 21st street. 3-sty., concrete foundation, brick and stone trim construction, steam heating, electric light, pitch and gravel roof, oak and fir finish.

The Saskatoon Flax Fibre Co. are planning to erect a new mill. Superintendend, A. H. Jans, 2-sty., concrete foundation, reinforced concrete construction, steam heating, electric ltg., pitch and gravel roofing.

Plans are ready for erection of an office building to cost $8,000, 2nd avenue, for P. J. Morton. Concrete foundation, brick construction, steam heating, electric lighting, pitch and gravel roofing.

Plans are ready for offices to cost $4,000, 2nd avenue, for K. W. Wiggins, Saskatoon. Brick construction, concrete foundation, steam heating, electric ltg., pitch and gravel roofing, fir finish.

Toronto, Ont.

Plans are drawn for 2 stores to cost $5,000, Nina avenue and Wells Hill rd., for C. Bingham, Cowan avenue. Architect, E. B. Varey, cor. Nina and Springhurst avenue. 2-sty., 41 x 126, brick, brick foundation, hot air heating, electric lighting, shingle roofing.

Plans are ready for office and warehouse to cost $200,000, for The National Drug & Chemical Co., 27-29 Wellington street west. Manager, W. W. Bole. 5-sty., stone foundation, reinforced concrete, fireproof construction, steam htg., gas and electric lighting, tar and rubble stone roofing, elevators, sinks, flues, gas attachments, fireproof brick, modern in every detail.

G. E. Webb, 35 Lynd avenue, will erect a store and apartments to cost $5,000 on Roncesvalles avenue and Dundas, Architect, J. M. Cowan, 65 Adelaide st. E. 3-sty., structural steel, electric and gas lighting, mantles, plate glass, felt and gravel roofing.

Tenders are open for building for Bank of Toronto, Queen and Logan ave. Architects. Chapman & McGiffin, 59 Yonge street. Brick, brick foundation, felt and gravel roofing, hot water heating, electric lighting, structural steel, sky-lights, cut stone, terra cotta sidewalk lights, hardwood finish, reinforced concrete, fireproofing, metal sash, vaults, plate glass.

Vancouver, B.C.

Tenders are called for store and rooming house on Pender street west. Architect, E. Stanley Milton Williams Bldg. 3-sty., 40 x 100, brick and mill construction with six store rooms on ground floor. Brick work, concrete work, plastering, plumbing, roofing, glass, carpenter work, electric wiring.

Walkerton, Ont.

A new factory for Canada Saddlery Harness & Wire Steel Goods Co., Walkerton, will be commenced at once and will be equipped with harness and wire steel goods machinery.

Windsor, Ont.

The Toledo Computing Scale Company, Windsor, Ont., and Toledo, Ohio, are contemplating the erection of a branch plant here. Plans and specifications are to be prepared for a building giving a floor space of 60,000 sq. ft. At present the firm has a small plant in the Medbury Power Building, Windsor.

Windsor, N.S.

Plans are being prepared for warehouse to cost $5,000, for R. J. Gibson. 100 x 50, brick foundation, wood construction, metal roofing. E. O. Wood, Windsor, will have charge of the business.

CONTRACTS AWARDED

Brantford, Ont.

The contract for the factory of American Radiator Co., of Chicago, Ill., to be erected here at a cost of $140,000, has been awarded to P. H. Secord and Sons, Limited, Brantford. The item in our issue of the 17th was an error.

Calgary, Alta.

Plans are prepared for oil warehouse to cost $4,000 for C. C. Snowden, 1810 11th avenue E. General contractor, J. F. Black, 237 19th avenue. 1-sty., 44 x 68½, concrete foundation, brick construction, electric lighting, tar and gravel roofing.

Store to cost $4,000 for F. Gascovne, 1504 17th avenue west. General contractor, J. A. Anderson, 16th street west. 1-sty., 42 x 50, concrete foundation, frame construction, electric lighting, hot air heating, shingle roofing.

Plans are ready for grain drying plant to cost $7,000, for Calgary Brewing & Malting Co., Calgary. Architect, B. Barthoid, Chicago, Ill. General contractor, Mr. Armstrong, 2334 16th street E., Calgary. Stone construction, concrete foundation, steam heating, electric light, gravel roofing.

Offices to cost $4,000, 1st street west, for United Agencies Ltd., 8th avenue west. General contractor, Jones & Lytle, Calgary. 1-sty., 40 x 40, hollow tile construction, concrete foundation, hot air heating, electric light, gravel roofing.

Plans have been prepared for warehouse to cost $30,000 for G. F. Stephens. Architect and general contractor, Claydon Bros., Calgary and Winnipeg. 2-sty., 50 x 20, reinforced concrete with brick curtain walls construction, steam heating, electric lighting, tar and gravel roofing, reinforced concrete floors.

Calgary, Alta. (East)

Plans are ready for office building to cost $48,000 for R. J. Burn, Centre street, Calgary. Architect, Leo Dowler. Gen. contractor is owner. 3-sty., 85 x 95, concrete foundation, electric light, steam heating, brick construction with gravel roofing.

Hamilton, Ont.

Addition to factory to cost $5,000, Arthur street, for Canadian Drawn Steel Co. Architect, Stewart McPhie, Bank of Hamilton Bldg. Contractor, G. E. Mills, 614 King street east.

Maisonneuve, Que.

Contract is awarded for shoe factory to cost $20,000, Desjardins street, for Dufresne & Locke, Ltd. Arcitect, Marius Dufresne, Bank of Toronto. General contractor, A. Marchessault, 207 Desjardins street. 3-sty., 75 x 102, concrete foundation, brick construction, steam heating, electric lighting, gravel roofing, concrete flooring, galvanized iron cornices.

Montreal, Que.

Repairs to shovel factory to cost $13,000, 183 Congregation street, for Geo. Wolfe & Sons, Ltd., 183 Congregation street. General contractor, Geo. Roberts, 79 Lagauchetiere street, will repair the roof and walls which were recently destroyed by fire.

Warehouse to cost $14,000, Notre Dame street E., for McColl Bros., Toronto. Designers, Byers & Anglin, 65 Victoria street, Montreal. General contractor, Byers & Anglin. 1½-sty., 83 x 100, concrete construction, with brick front, concrete foundation, electric ltg., tar and gravel roofing. concrete floors, one freight elevator required.

Addition to factory to cost $3,500 on Lachine Canal bank, for The Fenlin Leather Company, North Bank Lachine Canal. General contractor, L. J. Marchand, St. Patrick Boulevard and Davidson street. 2-sty., 30 x 60, concrete foundation, brick encased construction, steam heating, electric lighting, gravel roofing.

Contract is awarded for alterations to hotel, cost $11,000, University ave., for Oxford Hotel Company. Architect, D. J. Creighton, Jacobs Building. General contractor, Jas. Morison, 207 Guy street. Painting and glazing, C. Sonne, Jr., 73 Aylmer street. Electric wiring, Langston & Whalen, 196 Dorchester street west. Plumbing and heating, Pratt & Co., Ltd., 89 Cathcart street. Three storeys, 42 x 96, concrete foundation, Indiana limestone and brick front, tar and gravel roofing, electric lighting. To extend building forward to street line, one storey, and make interior alterations. Marble, Smith Marble & Construction Co., Ltd., Van Horne avenue.

North Battleford, Sask.

Contract is awarded for the erection of hotel to cost $50,000, at King street and First ave., for Wm. Todd & W. G. Graves, North Battleford. Architects, Stephenson & Evans, North Battleford. three storeys, 70 feet x 80 feet. Contracts for all trades were let to General Contractor, Fred Lewis Co., Ltd., 637-9 Somerset Block, Winnipeg, Man. Brick and stone construction, cut stone, Tyndall lime, steel beams, structural steel (Manitoba Bridge & Iron Works) asbestos roofing, Medicine Hat pressed brick, steam heating, jacket boiler, 240 gal. capacity, connected with range boiler of 120 gal. capacity, plumbing, Neponset paper, floor and ceiling joist anchors (Western Steel & Co.), steam heating.

Ottawa, Ont.

Plans are ready for club and offices, cost $8,000, on Elgin ave., for E. R. McNeil. Stewart & Larmouth, Ottawa. Architect, A. Weeks, Sparks street, Ottawa. General contractor, Shuttleworth & Black, Ottawa. 66 x 99, concrete and brick construction, electric light.

Plans ready for shop and residences to cost $3,500, Carruthers avenue, for A. Guenette. 52 Forest street, Ottawa. Gen. contractor is owner. 3-sty., 20 x 22, concrete foundation, double brick veneer construction, electric light, gravel roofing.

Saskatoon, Sask.

Office building on First avenue. Architect, M. Patent. General contractor, Shannon & Cassidy, Sask. 2-sty., concrete foundation, brick and stone construction, steam heating, electric lighting, asbestos and shingle roofing, oak flooring, vaults required.

Sherbrooke, Que.

Work has started on store and office to cost $5,000, King street, for T. G. Delisle. 3-sty., 30 x 60, stone foundation, brick and stone construction, steam heating, electric lighting, tar and gravel roofing. Work being done by day labor. Plans were prepared by a private architect.

Toronto, Ont.

Plans are ready for office to cost $5,000, King and Strachan avenue, for Massey-Harris, King street west. Architect and builder, G. M. Miller, 59 Yonge street. 3-sty., brick, steam heating, electric lighting, sky-lights, hardwood floors, leaded glass.

Office to cost $4,000, rear 578 Queen street, for Mr. Salter. Owner is architect and builder. 2-sty., brick, electric lighting, asbestos felt and gravel roofing.

Work has started on 10 stores and apartments to cost $65,000, cor. Queen and Hambly streets, for F. G. McBrien, 100 Bloor street west. Architect is owner. 3-sty., 140 x 150, stone foundation, brick construction, hot water heating, electric lighting, tar and gravel roofing.

Plans are ready for store and residence to cost $10,000, Claremont and Mansfield, for R. D. Marco, 287 Claremont avenue. Architect, W. G. Hunt, 679 Dovercourt road. Builder, Thos. Collins. 2-sty., 51 x 90, stone foundation, felt and gravel roofing, hot air heating, electric light, etructural steel, sky-lights, mantles, maple floors, plate glass.

Store and dwelling to cost $3,500 at 384 Queen street E., for S. Feldman, 384 Queen street E. Contractor, S. A. Waggett, 61 Bleeker street. 2-sty., brick, cement roofing, electric lighting. Address all communications to architect.

Walkerton, Ont.

Contract is awarded for addition to mill for Clarence Smith, Walkerton. Contractor for masonry, J. Tettler,

(Continued on page 7[illegible])

Tenders and For Sale Department

To Architects and Engineers

[illegible] in a tender must see your [illegible] first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract [illegible]

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works [illegible]

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at [illegible] offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg Commercial Travellers' Bldg.
Vancouver 429 Pender Street

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good monep in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

City of Moose Jaw, Sask.

Tenders for Paving

[illegible] marked, "Tenders for Paving," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon of **Wednesday, May 15th, 1912**, for the laying of approximately 34,000 square yards of pavement.

Plans, specifications and any further information may be obtained from J. Antonisen, City [illegible]

The lowest or any tender not necessarily ac[illegible]

A. W. MAYBERRY,
L. W. RUNDLETT
W. F. HEAL
City Commissioners.

17-19

TOWN OF WHITBY

Sealed tenders, addressed to F. Rogers, Chairman, will be received by the Water and Light Commissioners up until noon, **May 8th**, for the whole or part construction of the following [illegible]

(a) Filtering basin in sand on beach of Lake Ontario at pump house, with storage capacity of 120,000 gallons.

(b) Concrete intake well, at least 16 feet deep and with a storage capacity below zero lake level of at least 16,000 gallons.

(c) 500 feet of gallery filtration system extending from proposed intake well, with a storage capacity of at least 90,000 gallons.

(d) Labor laying all interconnecting piping, including depression of present intake pipe to conform to proposed well.

(e) Labor laying 4043 feet of 8-inch main for extension of water works system.

(f) Supplying of all pipes and specials for above works.

Tenders must state time of completion of contract. Any further information will be furnished by applying to

GEO. W. P. EVERY,
Supt. Water and Light,
Whitby, Ont.

17-18

City Engineer Wanted

Applications will be received by the undersigned up till twelve noon on **Thursday, the ninth** day of **May, 1912**, for the position of City Engineer of North Vancouver.

Applicants to state experience, qualifications and salary expected.

THOMAS SHEPHERD,
City Clerk,
North Vancouver, B.C.

16-19

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
Chicago, Ill.

t.f.

TOWN OF BERLIN

TENDERS

Sealed tenders will be received by the undersigned up to **noon of the Second day of May**, for the construction of a reinforced concrete bridge over the creek on Courtland avenue in the Town of Berlin, span 16 feet, width 60 feet.

Plans and specifications may be seen at the office of the Town Engineer, Berlin.

The lowest or any tender not necessarily accepted.

A. H. MILLAR,
Town Clerk.

17-18

Canadian Pacific Railway Company

Department of Natural Resources

Tenders for Timber Structures

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Timber Structures," will be received up to **noon of May 15th, 1912.**

The work to be let includes the timber structures in about half the area of the Eastern Section of the Company's Irrigation Block in Alberta.

Approximate quantities are 4,250,000 feet B.M. of timber and 80,000 cubic yards of excavation. All construction materials will be furnished by the railway company.

Plans, specifications and full information will be furnished on application to the undersigned. A deposit of $50.00 will be required before plans, etc., will be given out, which will be refunded on their return in good condition.

All proposals must be accompanied by a certified cheque, payable to the undersigned, for five per cent. (5 p.c.) of the amount of tender, to be forfeited as liquidated damages should the bidder neglect or refuse to enter into a contract if the work is awarded to him.

All proposals must be made on the standard form provided or they will not be considered. Any alterations thereto, interlineations or qualifying of prices may invalidate the proposal.

The right is reserved to reject any or all bids and to waive defects.

A. S. DAWSON,
Chief Engineer.

Calgary, Alta., April 15, 1912.
16-18

Concrete Mixer Wanted

Wanted to rent or purchase, second-hand, half-yard Concrete Mixer. Must be in first-class condition and cheap. Reply to J. Hilton, 70 Oxford street, Hamilton, Ont.

17-18

TENDERS

For Drainage Work

Stanley Township

Tenders for Drainage Work of by-law 11-1911, estimated at 30,500 cubic yards, will be received by the undersigned up to May 15th, 1912.

Copies of by-law sent on application.

JOHN E. HARNWELL,
Clerk of Stanley Township,
Varna, Ont.

16-18

Plant for Sale by Tender

The following machinery and apparatus in first-class running condition, is offered for sale by the Water and Light Commissioners, Whitby, Ont.:

1 John Inglis Corliss Engine, 16 x 36.
1 Wheelock Engine, 10 x 28.
1 Bullock 2-phase Generator, 2200 volt, 60 cycle, 100 kw., direct connected to exciter.
1 marble switchboard, 2 panel, complete with ammeters, voltmeter, rheostats, switches, separate phase regulator, and transformer 50 kw., 3500 to 2500 volts.

Also countershaft with bearings, pulleys, clutch couplings, and belts.

The above has run for about seven years, giving every satisfaction, but has now been displaced by hydro-electric power. The plant may be seen in operation by any prospective purchaser.

Tenders to be addressed to

F. ROGERS, Chairman,
W. and L. Commissioners,
Whitby, Ont.

17-18

The City of Fort William

Garbage Incinerator

Tenders sealed and endorsed "Tenders for Garbage Incinerator," and addressed to the Chairman of the Works Committee will be received on or before the **15th day of May, 1912**, at the office of the City Clerk, for the complete installation, including all buildings, of a fifty (50) ton incinerator plant and the operation of same for a period of three months after completion.

Forms of tender, on which all bids must be submitted, may be obtained from the office of the City Engineer.

A cash deposit of ten per cent. of the cost of the plant will be required, and same will be returned to the contractors on the completion of the three month period of operation.

The lowest or any tender not necessarily accepted.

JOHN WILSON,
City Engineer.

Fort William, April 11, 1912.
16-19

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 382, Winnipeg. 11-23

To Contractors

Whole and separate tenders will be received by the undersigned up to noon, **May 9th**, for all trades required in the erection of a Public Library Building at Owen Sound, Ont.

Drawings, specifications and other information may be obtained at the Architects, Forster & Clark's office, 887 Second Avenue East.

The lowest or any tender not necessarily accepted.

J. H. PACKHAM,
17-18 Chairman of the Board.

Books for Sale

A number of books of interest to engineers and contractors are offered for sale at about one-half their cost. Among them are the following:

Reinforced Concrete, 590 pages, by Albert W. Buel, C.E. Publishers, The Engineering News Publishing Co., New York.

Chemistry and Physics of Building Materials, 350 pages, by Alan E. Munby. Publishers, Constable & Co., London, Eng.

Principles of Reinforced Concrete Construction, 320 pages, by F. E. Turneaure and E. R. Maurer. Publishers, Jno. Wiley & Sons, New York.

Treatise on Masonry Construction, 740 pages, by Ira Osborn Baker. Publishers, Jno. Wiley & Sons, New York.

Baldwin on Heating for Buildings, Revised 16th Edition, 400 pages, by Wm. J. Baldwin. Publishers, Jno. Wiley & Sons, New York.

Cement Laboratory Manual, 120 pages, by L. A. Waterbury. Publishers, Jno. Wiley & Sons, [illegible]

Light and Heavy Timber Framing Made Easy, 395 pages, by Fred T. Hodgson. Publishers, Frederick J. Drake & Co., Chicago.

Practical Concrete Block-making, 75 pages, by Chas. Pallister. Publishers, Industrial Publication Co., New York.

Short Cuts in Carpentry, 90 pages, by Albert Fair. Publishers, Industrial Publication Co., [illegible]

Estimating Frame and Brick Houses, Factories and Outbuildings, 250 pages, by Fred T. Hodgson. Publishers, David Williams Company, New York.

Sanitation and Sanitary Engineering, 175 pages, by Wm. Paul Gerhard.

Structural Details or Elements of Design in Heavy Framing, 370 pages, by Henry S. Jacoby. Publishers, Jno. Wiley & Sons, New York.

Architectural Composition, 234 pages, by Jno. Beverley Robinson. Publishers, D. Van Nos [illegible]

Guide to Sanitary Inspection, 230 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, [illegible]

Building Construction and Superintendence, 900 [illegible] Nolan. Publisher, W. T. Comstock, New York.

The Water Supply, Sewerage and Plumbing of Modern City Buildings, by Wm. Paul Ger[illegible]

Modern Baths and Bath Houses, First Edition, [illegible] ers, Jno. Wiley & Sons, New York.

Resistance of Materials, 650 pages, by N. de Tedasco and A. Mauel.

Modern Homes, 240 pages, by T. Raffles Davidson. Publishers, Geo. Bell & Sons, London, Eng.

The above books, together with a number of others, may be seen at the office of the Contract Record, 220 King street west, Toronto. Further particulars of any book furnished on request.

VILLAGE OF EXETER

Tenders will be received up to **Monday, May 6th next**, for about 6,000 feet of 4-in. and 6-in. cast iron waterworks pipe, also about one dozen hydrants and valves. The lowest or any tender not necessarily accepted. For further information apply to the undersigned.

F. W. FARNCOMB,
Consulting Engineer,
17 London, Ont.

Tenders Wanted

The undersigned will receive tenders and marked "Tender," up to the hour of 7.30 o'clock p.m., **May 21st, 1912**, for the sale of Debentures of the Township of North Gower, for the erection of a Public School House in U. S. S. No. 6, for the sum of Seven thousand dollars ($7,000), bearing interest at the rate of five per cent. per annum, payable in ten equal annual instalments, on the first day of January, the first instalment falling due and payable January 1st, 1913. Each instalment amounting to $906.54.

J. E. CRAIG,
18 Township Clerk and Treasurer.

Notice to Contractors

Sealed tenders for the construction of the new Church at Shelburne will be received bp the undersigned, Church Wardens, up to **Wednesday, May 8th, 1912**, at 9.00 p.m. Plans and specifications may be seen at the Rectory on the Church grounds. Tenders to be marked as such and addressed to

H. WHITE,
GEO. BERWICK,
[illegible]
April 25th, 1912. 18

Tender for Sewer

EXETER, ONT.

Tenders will be received up to **Friday noon, May 10th next**, for the construction of about 3,000 feet of vitrified sewer pipe. Plans and specifications and forms of tender may be seen at the office of either of the undersigned. The lowest or any tender not necessarily accepted.

F. W. FARNCOMB, Consulting Engineer,
London, Ont.
T. B. CARLING, Town Clerk,
17 [illegible]

CITY OF VERNON

Tenders Wanted

Tenders will be received by D. G. Tate, City Clerk, Vernon, B.C., until three o'clock p.m., **May 1[illegible] 1912** [illegible] foundation supplied by the city, of one 200 B.H.P., 257 R.P.M. Diesel Oil Engine for direct connection to 125 kw., 3-phase, 60 cycle alternating current generator with exciter engine. Must be complete with indicator, all tools and spare parts.

[illegible] ronto, or of the Consulting Engineers, Mather [illegible] after April the 29th.

Lowest or any tender not necessarily ac[illegible]

D. G. TATE, City Clerk,
18 Vernon, B. C.

United Counties of Northumberland and Durham

ONTARIO

Sealed tenders will be received by the undersigned up to **May 14, 1912**, for the construction of Sewage Disposal Works for the House of Refuge, Cobourg. Specifications may be obtained from, and plans seen at the office of the Engineer, T. Aird Murray, 303 Lumsden Building, Toronto, or at the Town Hall, Cobourg.

The lowest or any tender may not be accepted.

NEIL F. MacNACHTAN,
Counties Clerk,
18 Cobourg, Ont.

CITY OF REGINA

Province of Saskatchewan

Sewage Disposal Works

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon, **Wednesday, May 15th**, for the construction of:—

Two Filter Beds.
One Stand-bye Tank.
Pipe lines connecting with the various parts of the works.

An accepted bank cheque for the sum of $2,500 must accompany each tender.

The city reserves the right to reject any or all bids, and to waive any irregularities therein.

Copies of plans, specifications, schedule and form of tender, and full information may be had from the undersigned.

J. M. MacKAY, Chief Engineer,
Trunk Sewer Works.
[illegible] 18

TENDERS

For Police Station on Markham Street

Bulk tenders, or tenders for the several trades mentioned below in connection with the above building, will be received by registered post only, addressed to the undersigned, up to noon, **Tuesday, May 7 ,1912**.

1. Mason work, etc.
2. [illegible]
3. [illegible]
4. Gas Fitting and Plumbing.
5. Hot water Heating.
6. Electric Wiring and Light Fixtures.
7. Plastering.
8. Painting and Glazing.
9. Tiling.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, City Hall, Toronto.

[illegible] City By-law, must be strictly complied with, or [illegible]

Tenderers shall submit with their tender the [illegible]

[illegible]

G. R. GEARY, Mayor,
[illegible]
City Hall, Toronto,
[illegible]

CITY OF GUELPH

Tenders for Bridge

Tenders will be received by T. J. Moore, City Clerk, up till noon on **Wednesday, May 15th, 1912** for the construction of a reinforced arch bridge and viaduct for foot traffic on Heffernan street, over the C. P. R. and the River Speed, having a total length of about 520 feet.

Plans and specifications may be seen at the office of the City Engineer, Guelph, or at the offices of the Contract Record and The Canadian Engineer, Toronto, or may be obtained from the City Engineer for the sum of Five Dollars, which will be returned upon return of the plans.

A marked cheque for $100 must accompany each tender.

The lowest or any tender not necessarily accepted.

J. HUTCHEON,
City Engineer.

Guelph, Ont., April 29, 1912.

Notice to Contractors

We want every contractor in Canada to receive our quarterly list of new and also used contractors' equipment on hand and for sale. The Spring list is just out, and a postal card will bring it and all subsequent issues. Machinery listed comes under the following headings:

Crushers and Crushing Plants
Drag Line Excavators
Cableways
Steam Shovels
Locomotives and Dinkies
Ballast and Dump Cars
Concrete Mixers
Hoisting Engines and Derricks
Trench Machines
Compressors
Engines and Boilers
Road Rollers, Graders ans Tractors
Pumps, Drills, etc.

Write to-dav.

MARSH COMPANY,
Old Colony Building,
Chicago, Ill.

TOWN OF MELFORT

SASKATCHEWAN

Sealed tenders will be received by J. E. Durnin, Secretary-Treasurer of the Town of Melfort, Saskatchewan, until noon on **May 29th, 1912**, for the supply and delivery of the following machinery and materials, and for the performance of certain works:—

Tender "A."—For the supply and delivery of generator, exciter and switchboard, transformers and meters, series Tungsten street lighting apparatus.

Tender "B."—Supply, delivery and erection of 150 B.H.P. internal combustion engine.

Tender "C."—Supply, delivery and erection of pumps and motors.

Tender "D."—Supply and delivery of poles, wires, line material, etc.

Tender "E."—Erection of pole line.

Tender "F."—Erection of Power House, and construction of reservoir.

Tender "G."—Erection of sewerage disposal works.

Tender "H."—Supply and delivery of approximately 29,000 ft. of steel water pipe and specials. Approximately thirty hydrants and thirty valves.

Tender "I."—Trenching and laying steel water pipe, setting hydrants, valves, etc., and back filling.

Tender "J."—Supply and delivery of approximately 13,500 feet of vitrified sewer pipe, excavating, laying, and construction of manholes, etc.

Tender "K."—Supply and delivery of two pneumatic storage tanks.

Plans and specifications may be seen at the office of the "Canadian Engineer," Winnipeg, Toronto and Montreal, and at the Consulting Engineer's office, Bottomley Block, Saskatoon, Saskatchewan.

A marked cheque for five per cent. of the amount of the tender must accompany each bid.

The lowest or any tender not necessarily accepted.

J. E. DURNIN, Secretary-Treas.,
Melfort, Sask.

McArthur, Murphy & Underwood, Engineers,
18-21 Bottomley Block, Saskatoon, Sask.

TENDERS

Whole or separate tenders will be received by the undersigned until **Saturday, May 11**, for the several trades in connection with the erection of a Carnegie Free Library at Aylmer, Ont.

Plans and specifications may be seen at the office of the Architect, W. A. Mahoney, Telephone Building, Guelph, or at the Molson's Bank, Aylmer.

Lowest or any tender not necessarily accepted.

D. N. McGREGOR,
18 Sec'y, Aylmer Library Board.

Business Buildings and Industrial Plants

(Continued from page 73)

Walkerton. Carpentry, Schamlin Bros., Mildmay, Ont. 1-sty., 85 x 22, cement construction. Mill for chopping grain.

Winnipeg, Man.

Contract is awarded for machine shop to cost $16,568, cor. Ross and Tecumseh streets. General contractor, J. W. Astley, City Yards, Engineer of Construction.

Power Plants, Electricity and Telephones

Aylmer, Ont.

Forbes Bros., Seaforth, have received the contract for the telephone line at Aylmer, Ont., and also at Shakespeare.

Ottawa, Ont.

Tenders will be received by the chairman of the Waterworks Committee (City Hall) until May 14th, 1912, for the following machinery: Supply and installation of 2 electrically operated pumping units, each unit to have a capacity of 2000 imperial gallons per minute.

Miscellaneous

Hamilton, Ont.

Tenders will be received by the City Clerk addressed to Mayor Geo. H. Lees, until 5 p.m., May 30th, for the following supplies: Flanged special castings for Beach Pumping Station, 3 Venturi meters, 2 travelling cranes, water tower & rubber boots. Specifications and forms of tender may be obtained from City Engineer's office. Lowest or any tender not necessarily accepted. Clerk, S. H. Kent. Engineer, Mr. Macallum.

Toronto, Ont.

The Fire Dept. will purchase apparatus as follows:—2 combined hose wagon and chemical engine motors; 1 combined hose wagon and chemical engine motor, at an approximate cost of $15,700 for the former and $7,850 for the latter. Secretary, R. J. McGowan. Chief, J. Thompson.

Business Notes

The warehouse building on Emerald street owned by the American Can Co., Manager, Kenneth Bethune, was damaged to the extent of $10,000 and will be repaired.

Montreal, Que.

Shoe factory on Demontigny street, occupied by Tetrault Shoe Mfg. Co., also by Thos. Davidson Mfg. Co. burned. Damage to building $3,000, to machinery $4,000; building will be repaired.

Four-storey warehouse 50 x 130, burned. Owned by The Grey Nuns; occupied by J. R. Walker Co. Loss $20,000. The building will be repaired.

Ottawa, Ont.

Section of factory of Hugh Carson & Co., Sparks street, destroyed by fire. Loss $5,000.

New Companies

Marshall-Davis Limited have been incorporated with a capital of $50,000, to manufacture, sell or install electrical and gas equipment, appliances or other metal specialties, the head office is at Dunnville, and the provisional directors are R. A. Harrison, V. J. Davis and W. A. Fry, all of Dunnville.

The Soo Dredging and Towing Company, Limited, has been incorporated with a capital of $100,000, to carry on business as builders and contractors, with head office at Sault Ste. Marie. The provisional directors are Peter Edward, G. M. Edward and W. S. Edward, all of Sault Ste. Marie, Mich.

Galbraith & Company, Limited, have been incorporated with a capital of $75,000, to carry on business as dealers in logs, shingles, lumber, timber limits, etc., with head office at Owen Sound, the provisional directors are M. E. Galbraith, E. J. Harrison and W. P. Telford, Jr., all of Owen Sound.

McAllisters, Limited, have been incorporated, with a capital of $40,000, to carry on a general land and building business, with head office at Berlin, Ont. The provisional directors are J. A. McAllister, of Berlin, and Geo. McAllister, of Guelph, Ont.

Kingston Brick and Tile Company, Limited, has been incorporated with a capital of $100,000, to carry on business as manufacturers and dealers with head office at Kingston, Ont. The provisional directors are R. H. Waddell, A. Neal and J. F. Lesslie, all of Kingston.

The Brockville Investors, Limited, have been incorporated with a capital of $64,000, to carry on business as land and building company, with head office at Brockville. The provisional directors are D. G. M. Galbraith, W. A. McFarlane, Harvey McKean and E. G. Joy, all of Toronto.

The Lakeview Land Company, Limited, has been incorporated with a capital of $40,000, to carry on a general land and building business, with head office at Hamilton. The provisional directors are N. W. Pruner, T. T. Caster, of Toronto, and Salem Coons, of Hamilton.

The Doric Portland Cement Company, Limited, has been incorporated, with a capital of $500,000, to deal in cement, lime, artificial stone and other building materials, with head office at Owen Sound, the provisional directors are P. W. Sabiston, W. P. Telford and J. H. Spence, all of Owen Sound.

Salter-Disher Steel Company, Limited, has been incorporated with a capital of $300,000, to carry on business as general contractors, foundrymen and dealers in structural metals, with head office at Toronto. The provisional directors are C. Rankin, C. E. Disher and W. H. Salter, all of Toronto.

PENSTOCKS

We build and erect PENSTOCKS, WATER TOWERS,
STAND PIPES and all kinds of HEAVY PLATE WORK

**End View Penstock Distributor built for Ontario Power Co.
Niagara Falls, Ont.**

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Marine and Tubular Boilers
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Special Machinery of all kinds

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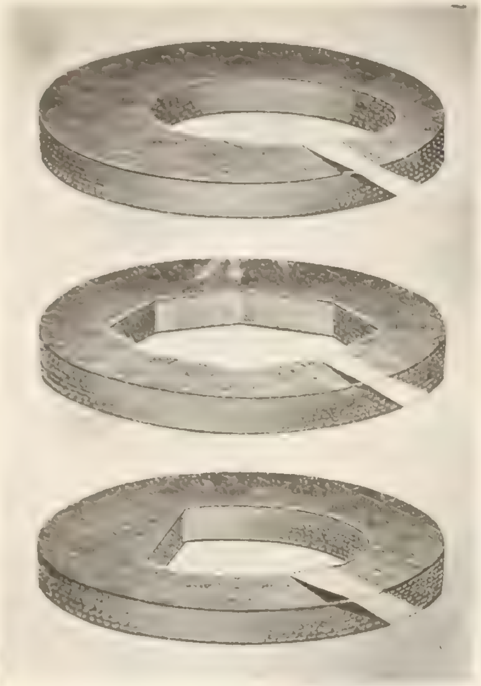

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We make a specialty of Steam Hose, Air Hose, Water Hose, Suction Hose, and Dredging Sleeves.

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A Growing Necessity

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is a clean, noiseless, resilient, permanent pavement which will resist the hardest treatment. Compared to any other form of bituminous pavement it

COSTS LESS TO LAY—
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J. H. McKnight Construction Co., Limited

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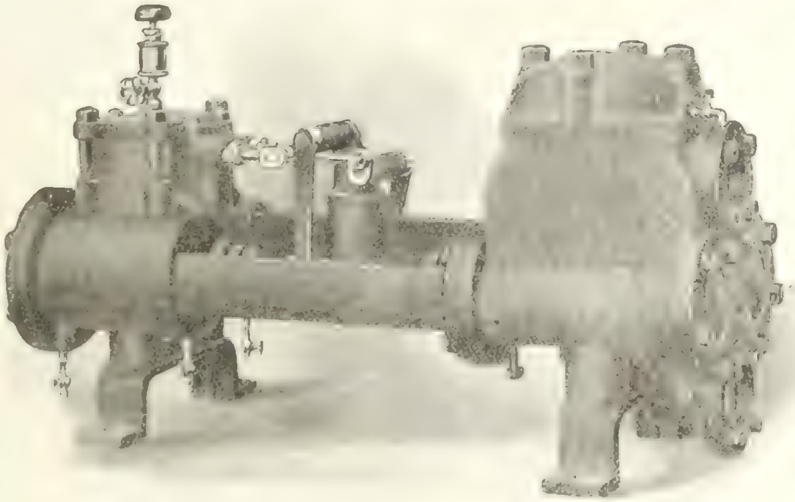
FOR ALL PURPOSES



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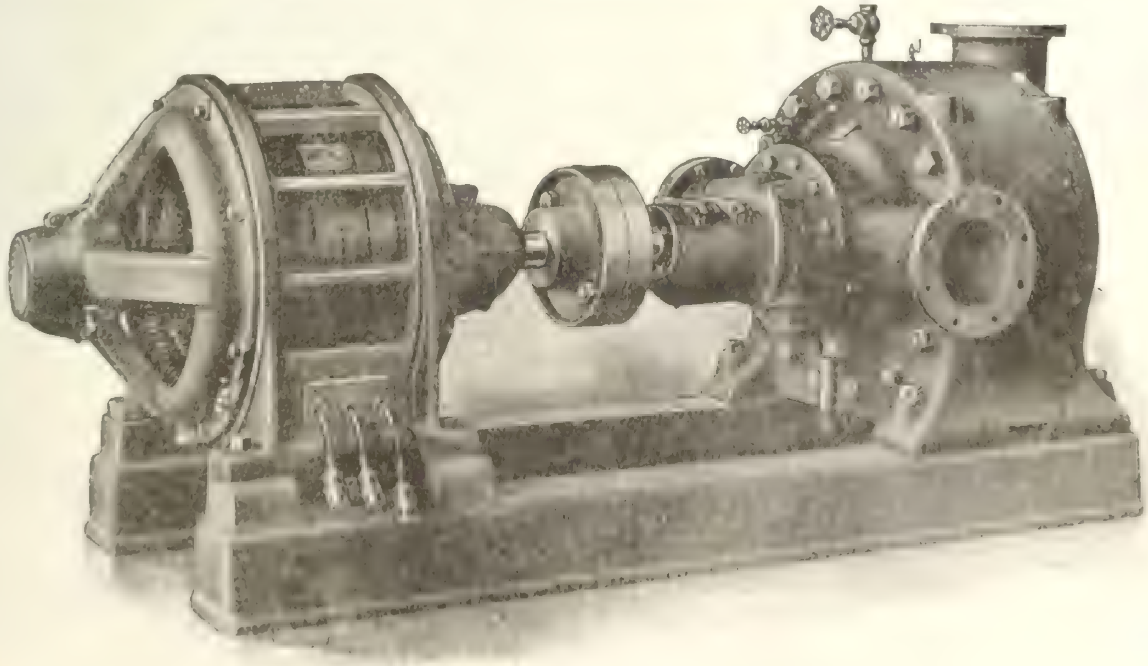
WORKS: WILLIAM and SEIGNEURS STREETS, MONTREAL
Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

Electrically Operated Turbine Pumps for All Duties



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10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line **2,600 Lbs.**

On a Double Line will Lift **5,200 Lbs.**

160 Feet per Minute
80 Feet per Minute

Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

Weight with Boiler, 4,000 lbs; without Boiler, 2,400 lbs. Light enough to be moved about easily.

Length over all, 5 ft. Width over all, 5 ft. 10 in. This Engine is also made non-reversing, at a reduced price and weight. Made with One Drum or Two Drums.

Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

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Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

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FLAT ROOFS ?

It is an easily laid roofing and makes a durable, fireproof and weatherproof job.

We want every Contractor and Builder to have a sample of this "Flat" Roofing, also our Illustrated Catalogue. Sent free on request.

Corrugated Iron **Metallic Shingles**
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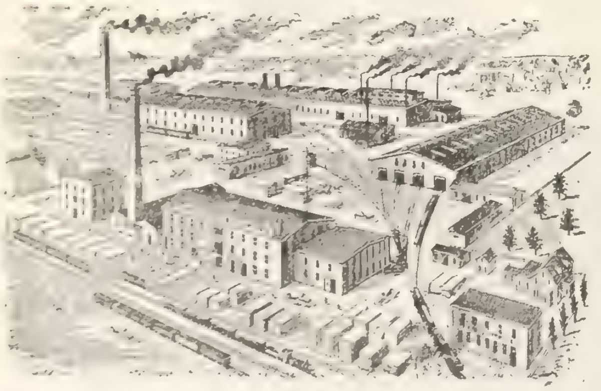

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In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

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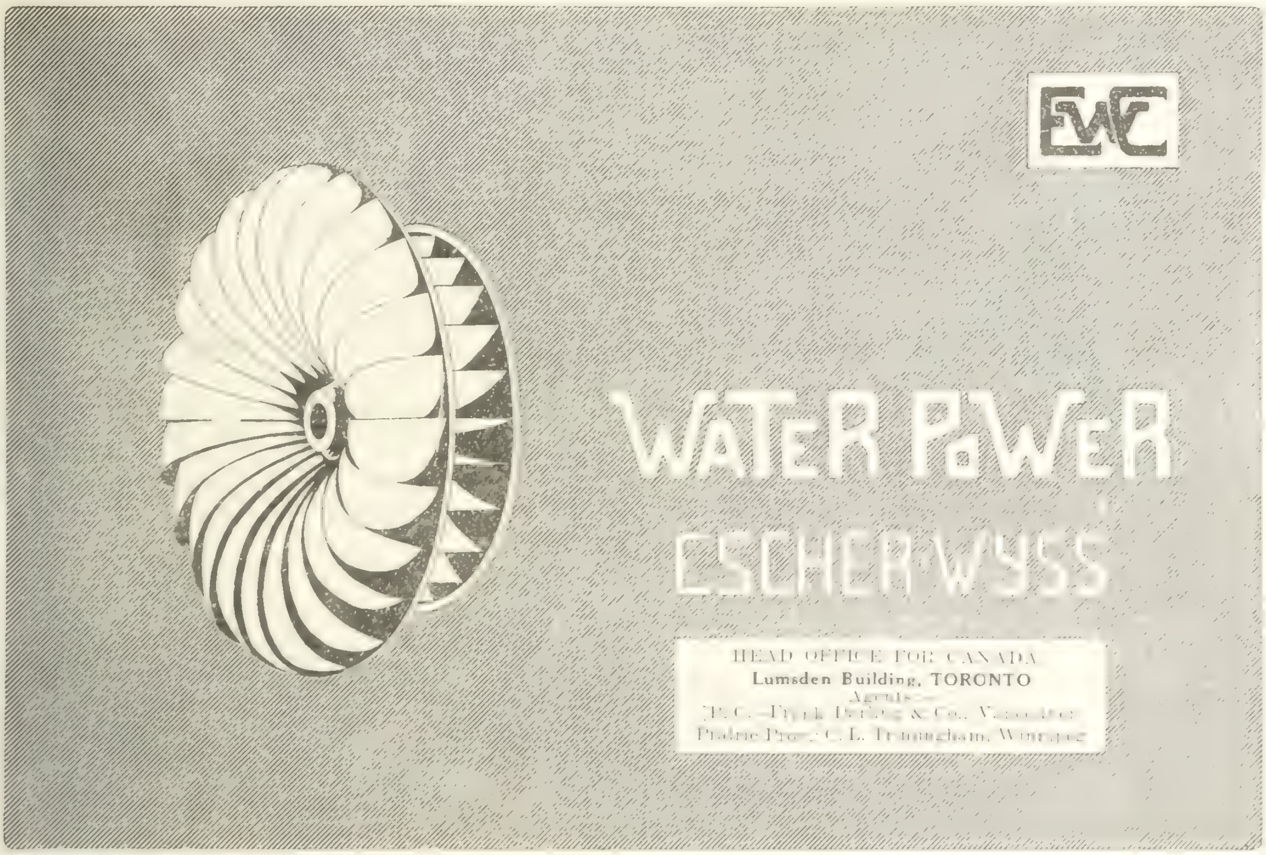

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Agents—
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This Fountain is Waterproofed With Ceresit

Ceresit is a cream white paste which is dissolved readily in the water used in mixing concrete or cement mortar. By this method the Ceresit is uniformly distributed through the aggregates, thus filling the voids and giving greater density and strength to the concrete and mortar, and rendering it absolutely impervious to water or dampness even when subjected to great hydrostatic pressure.

"Ceresit" Waterproofing

Ceresit acts as a protector to concrete and cement by keeping the materials dry it prevents disintegration by frost.

Ceresit itself cannot crack or be chipped off as it is an integral part of the mass. It therefore has a quality of permanence not possessed by mere coatings or paints, which at best are cheap substitutes that prove costly in the final test of time. Ceresit is economical in labor, requiring no extra mechanical apparatus or mixer. Ordinary workmen can mix Ceresit by the simple directions that always accompany the product.

Ceresit does not darken the concrete or cement, but it does give it strength. We guarantee Ceresit to be an efficient waterproofing for any job we undertake and direct, and to prove our faith we will put up a cash bond if needed.

Fountain in the Country Life Gardens, Garden City, Long Island, N.Y.

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Agents wanted in unoccupied territory

All [illegible] give Ceresit a fair trial. It will not disappoint the most exacting architect, engineer, contractor or owner.

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have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.

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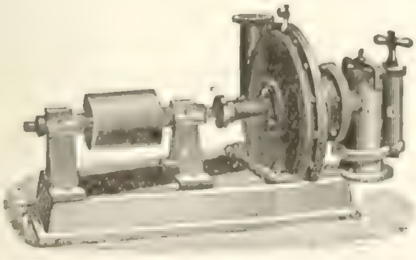
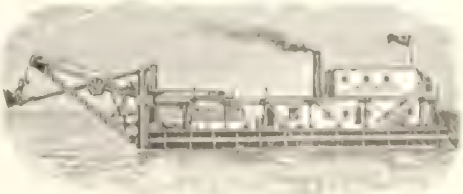
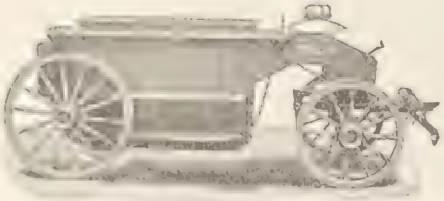




A Ten Hour Wagon



After all, the horse is the boss of an ordinary job. When the horse crawls the work crawls. When the horse works willingly and pulls easily, the dirt flies.

The long hot days are coming. You want the easiest running wagon you can buy. Get 10 hour Troys—short coupled, light in weight, low down.

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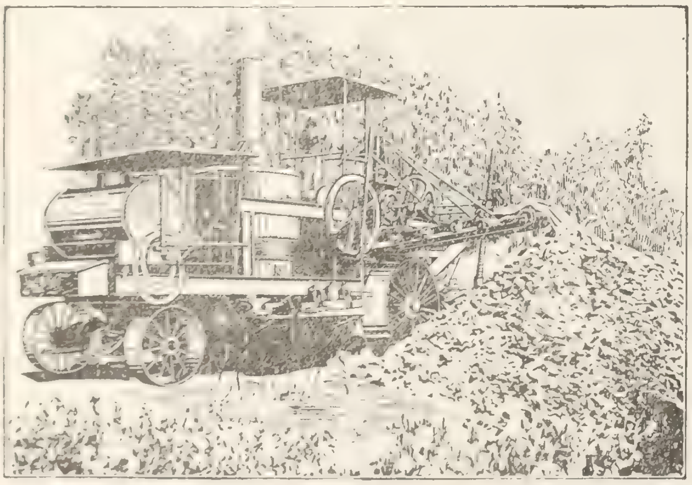

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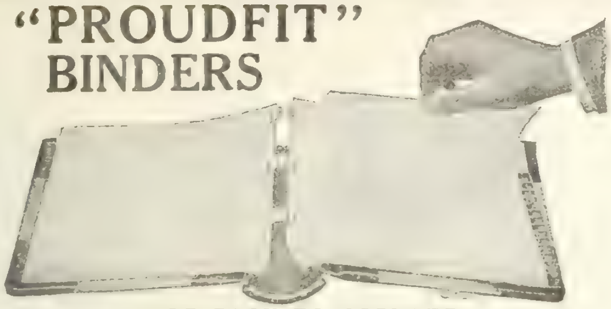

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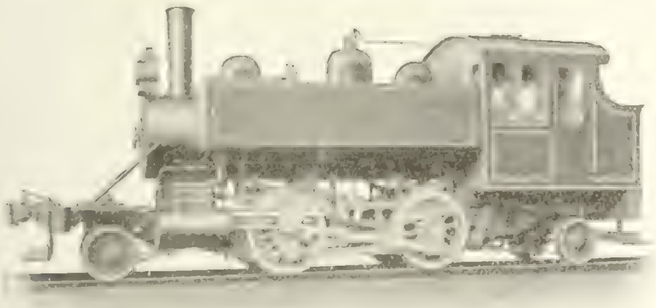

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It must provide just the right amount of the right material in the right place.

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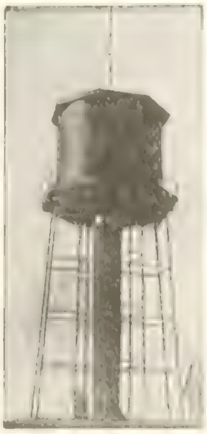

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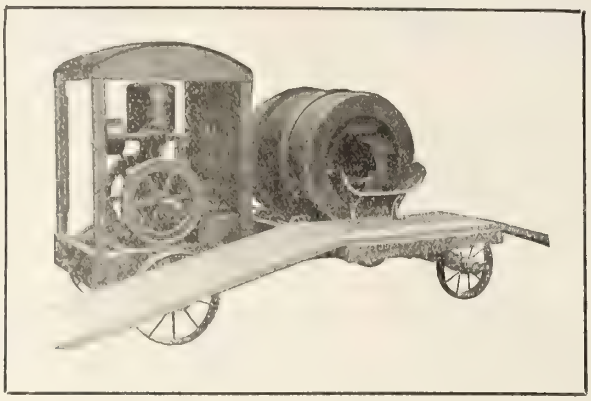
"The Standard" Batch Mixer



Low Charging

What are the substantial reasons for the enviable position of "The Standard" Low Charging Concrete Mixer?

What is the source of enthusiasm which every contractor and user has for "The Standard" Batch Mixer?

What qualities does it possess which compel the contractor, after having used "The Standard" to consider no other mixer

What advantage does the contractor using "The Standard" enjoy day by day which convinces him that he has the best mixer?

What causes contractors using "The Standard" to report that they would not exchange for any other mixer, no difference what the price.

What is the explanation for contractors everywhere ordering "The Standard" Low Charging Concrete Mixer, frequently exchanging or discarding other machines costing two and three times as much.

Low Charging—Simplicity—Results

"The Standard" patented Low Charging open drum, whereby the materials are charged into the mixer from a low platform about two feet from the ground, is, perhaps, the most important and highly appreciated feature.

"The Standard" simplicity is another of the principal features. Only the mixing drum, simply connected to the power for driving.

"The Standard" open drum, enabling the batch to be inspected while mixing results in high grade uniform concrete.

"The Standard" patented semi-automatic discharge is operated from either end of the drum.

"The Standard" simple equipment is built compact and light and can be moved to the best mixing location on the job in a moment's time.

"The Standard" easy of access to all parts, including interior of the mixing drum.

"The Standard" moderate size outfit, has surprisingly large mixing capacity per day. Not necessary to purchase big machines.

"The Standard" can usually be placed in cars for shipment without taking apart except removing platform, which is held by four bolts.

"The Standard" weight is not excessive and transportation charges by freight or drayage are reduced to a minimum.

"The Standard" is economical in first cost as well as economical in operating cost.

"The Standard" all regular sizes in stock at factory, warehouses and agencies ready for immediate shipment.

The Standard" special designs to meet particular requirements often afford great saving in operation.

"The Standard" built in capacities two to forty cubic feet per batch, twenty to three hundred cubic yards per day.

Advantages Which the Contractor Enjoys and Disadvantages Which He Escapes When Using "The Standard" Batch Mixer

"The Standard" is low charging. The materials are charged into the mixer from platform about two feet from the ground, avoiding building high platforms with long runways or purchasing complicated charging hoists and hopper arrangements.

"The Standard" simple construction is always ready for use, and avoids frequent break downs, so common with all complicated machinery, especially when subject to rough usage around building operations.

"The Standard" discharging arrangement simply operated from either end of the drum, saves extra man required with other machines.

"The Standard" easy running avoiding unnecessary friction, requires less power, less fuel and less attendance.

"The Standard" moderate weight machine can be easily moved from job to job, avoiding excessive freight charges or heavy hauling expense. The moderate weight machine can also be located any place on the job, often avoiding much manual labor.

"The Standard" special designs to meet peculiar requirements frequently saves heavy expenses.

The contractor using "The Standard" Batch Mixer will find he enjoys numerous other advantages and escapes many additional disadvantages.

If you wish to know more about "The Standard" write for catalogue No. 245. It will be of value to you.

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We can furnish designs and estimates for any type of Steel Bank Head or Head Frame, or for the complete Bank Head Equipment, and will contract to erect same at any point in Canada. We designed and constructed the steel Bank Head at the "Allan Shaft" Colliery of the Acadia Coal Company, Stellerton, N. S. This is the largest Coal-Mine Bank Head in Canada, and one of the largest in America.

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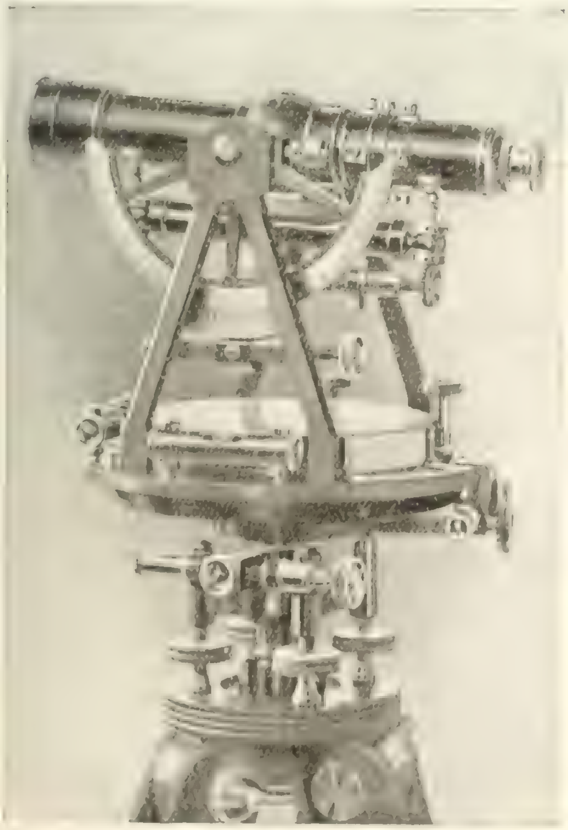

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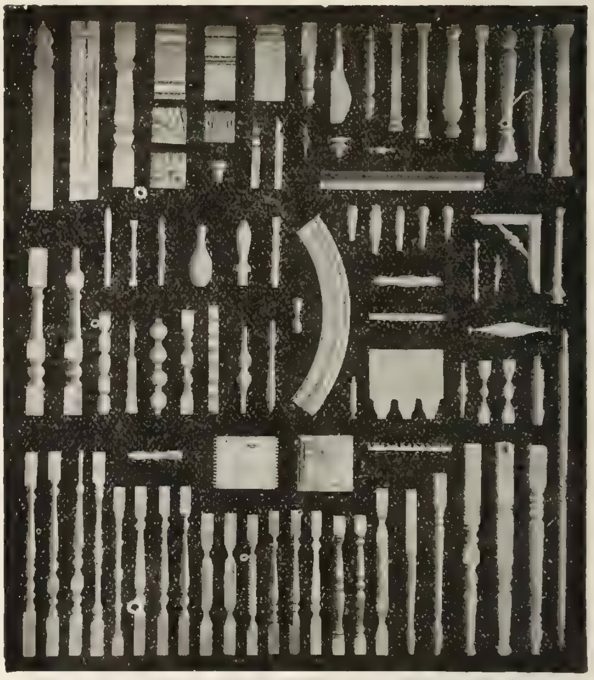
Walker & Barnes	Edmonton, Alta.
The Ritchie Contracting & Supply Co. Ltd.	Vancouver, B. C.
631 Coristine Building	Montreal, Que.



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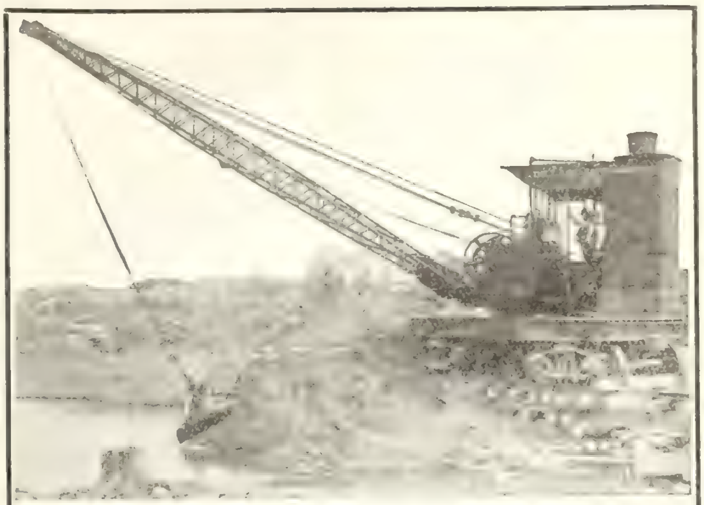

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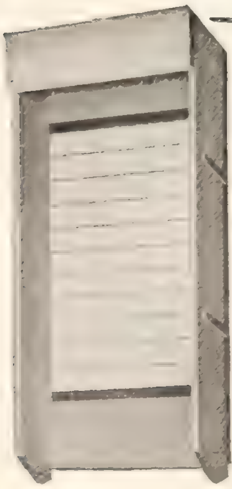

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No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$2.65	$4.05
40	2.85	4.50
50	3.25	4.81
60	3.45	5.50
70	3.75	6.32
80	4.25	6.87
85	4.70	7.70
90		9.07
96		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

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Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock	net $1.75
No. 4½ Fuller's	net $2.35

Square head brass cocks, 65; iron, 65 per cent

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks

16 x 24, $1 00; 18 x 30, $1 15; 18 x 36, $1 95

Lead Pipe

Lead pipe, 25 per cent. off, lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.00.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

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Pure White Lead, ground in oil, $7 per 100 lbs. per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 95c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 92c. per gallon of 9 lbs.

Turpentine, in barrels, 69c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs

New Companies

Canadian Finance and Securities, Ltd., have been incorporated with a capital of $50,000, to carry on business as contractors, dealers in lumber, timber, etc., with head office at Toronto. The provisional directors are H. J. Macdonald, W. T. Stuart and G. C. Craig, all of Toronto

Citizens' Home Construction, Limited, have been incorporated with a capital of $10,000, to carry on business as a general land and building company, with head office at Toronto. The provisional directors are L. C. Todd, W. G. Atkin, and J. E. Robinson, all of Toronto.

The Runnymede Realty Co., Ltd has been incorporated with a capital of $60,000, to erect buildings and deal in all kinds of building materials with head office at Toronto. The provisional directors are S. Slatky, M. Slatky and Solomon Slatky, of Toronto.

The Peninsula Realty Company, Ltd., has been incorporated with a capital of $40,000, to carry on business as a land and building company, with head office at Hamilton, Ont. The provisional directors are T. W. Hand, R. B. Harris and P. M. Cooke, all of Hamilton.

The Typo Telegraph Company, Ltd., has been incorporated with a capital of $500,000, to carry on business as a land and building company, with head office at Hamilton, Ont. The provisional directors are R. E. Hopkins, W. A. Fraser and H. S. Salt, all of Toronto.

Carlyle & Beck, Limited, have been incorporated with a capital of $40,000, to carry on business as a general contracting and construction business with head office at Toronto. The provisional directors are David Carlyle, E. H. Beck and W. M. Carlyle, all of Toronto.

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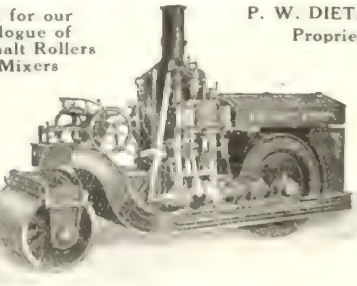

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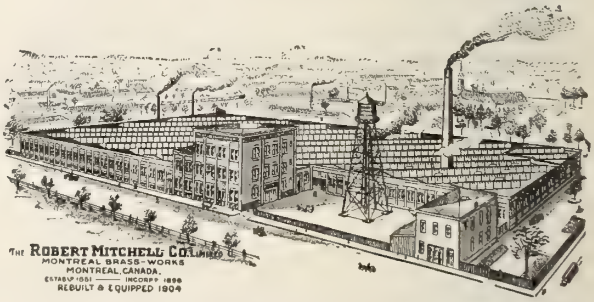
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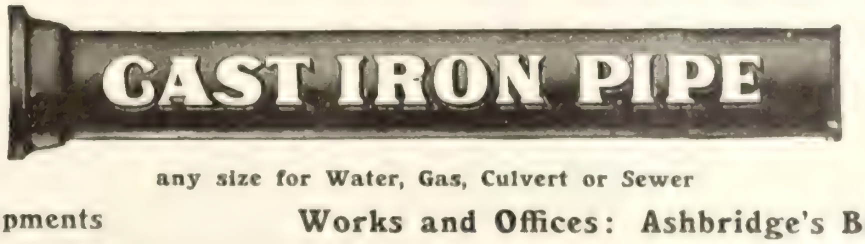

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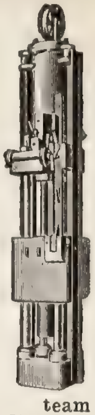

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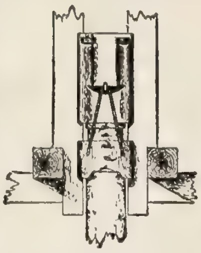

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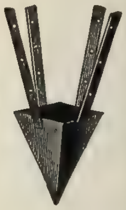

Mahan & Company

908-909 Chamber of Commerce Building

Chicago, Ill.

Block, Sawed, Planed
and Turned

Bedford Stone

Quarries and Mills

near Clear Creek, Indiana

Chicago Mill and Storage Yard:

2126-2142 So. Kedzie Ave. and C. B. & Q. Tracks

Producers of the Celebrated

"Peerless"

Bedford Stone

Bedford Indiana Limestone

Mill Blocks
Sawed Planed and Turned Stone

W. McMILLAN & SON

(Incorporated)

General Offices
Chamber of Commerce Building
CHICAGO, ILL.

Quarries and Mills { Bedford, Ind.
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For Sale for Immediate Delivery

1—Buckeye Trench Machine, cuts trench 15 in. x 5½ ft.
1—Buckeye Trench Machine, cuts trench 28 in. x 7½ ft.
1—Buckeye Trench Machine, cuts trench 36 in. x 12 ft.
1—Parson Trench Machine, cuts trench 24 in. to 60 in. x 20 ft.
1—Municipal Trench Machine, cuts trench 24 in. to 72 in. x 20 ft.
I—26 ton Little Giant Traction Shovel.
1—45 ton Vulcan Track Shovel.
1—No. 0 Thew Full Circle Shovel.
1—No. 5 Austin Crusher with Corrugated Head and Back Gear.
1—No. 5 Gates Crusher Style "K" with smooth head in excellent condition.
1—No. 5 McCully with new head and new shaft.
1—Set of 16 in. x 36 in. McCully Rolls.

CREAM CITY EQUIPMENT COMPANY

600 Majestic Building, Milwaukee, Wis., U. S. A

The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

Write us for particulars

Tide Water Iron Works
HOBOKEN, N. J., U. S. A.

The Ontario Lime Association
Limited

Builders' Supplies

Head Office:
510 Crown Life Building, Queen and Victoria Streets

Phones: Main 5472-5473
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Grey Lime	Hard Wall Plaster
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Portland Cement	Plaster Paris
Atlas White Cement	Plasterers' Hair
Keenes Cement	Iron Staunchions
Waterproofing Cement	Mortar Colors
Fire Brick	Weeping Tile
Soot Doors	Sewer Pipe

We can make immediate delivery of any of the above materials from any one of our branch yards. Would be pleased to have your order.

"Hammer Brand"

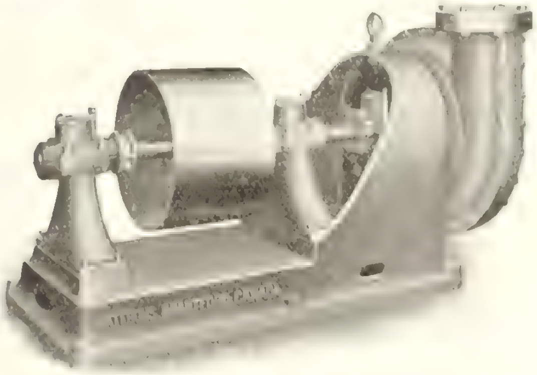
Hard Wall Plaster

HARD-WALL PLASTER
HAMMER
BRAND
HILLSBOROUGH, N.B.

It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

Albert Manufacturing Co.
Hillsborough, New Brunswick, Canada

The Contractor's Pump



THE Waterous—*the Pump with the* [illegible]—combines simplicity, strength, durability and compactness. It is specially adapted for general contracting purposes.

¶ It will not clog up, can not get out of order, will run every minute of a ten hour day and can be left in charge of an unskilled laborer without going to pieces.

¶ Built in sizes up to 14" discharge, in Vertical and Horizontal types, for belt, motor or engine drive.

Ask for Bulletin No. 200.

The Waterous Engine Works Co.
Limited
BRANTFORD, CANADA
Agent:—Hugh Cameron & Co., 72 Queen St. E., Toronto, Ont

Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Use Herringbone Metal Lath

THIS KIND

on suspended ceilings for fireproof buildings.

Why Herringbone?

Because the edges of the sheets have an interlocking selvage and are truly parallel. This means no wiring between furring is necessary, and saves two and one half cents per yard in labor cost.

There are seven other reasons equally good.

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, **Toronto**
Metal Shingle and Siding Co., Manufacturers

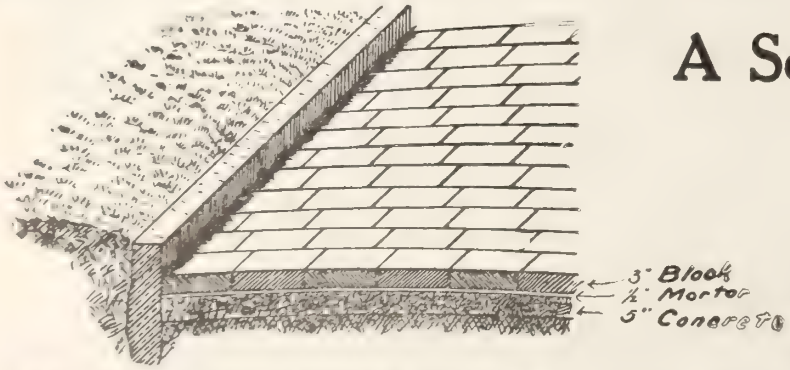
A Great Favorite

The man who knows a good thing when he sees it, and who wants a good thing when he hears of it, is the man who will insist upon having

Port Credit Brick

Architects and contractors who cater to this class of men will be acting directly in their own interests by specifying this brand

Port Credit Brick Co.
Limited
McKinnon Bldg., Jordan and Melinda Sts., TORONTO
Works: Port Credit, Ont.



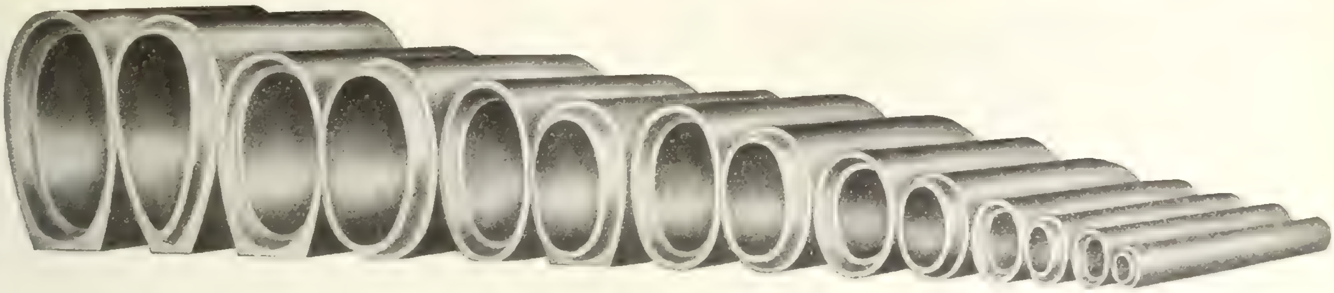
A Scientific Pavement

must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.



Sewers and Culverts

properly built of properly made

- Reinforced Concrete Pipe -

LAST FOREVER.

OUR MATERIAL, SYSTEM and PRODUCT have been tested and approved by EMINENT ENGINEERS. NO RUST, NO ROT, NO FROST-BREAKS, NO PRESSURE-BREAKS, NO HIGH PRICES, NO DELAYS IN PROCURING, NO TROUBLE IN HANDLING.

STANDARD REINFORCEMENT, or SPECIAL if required. Stock sizes 6 in. to 60 in.

Patronize Experienced and Reputable Manufacturers.

Catalogue and prices on application.

Dominion Concrete Company Ltd.

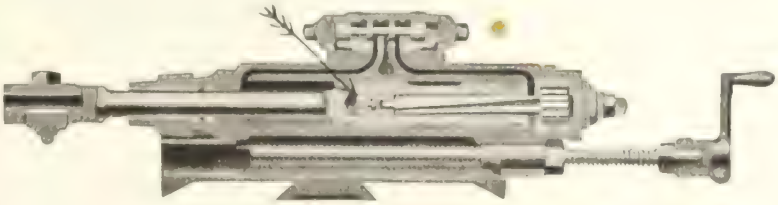
Kemptville, Ontario

Don't Get in a Rut. Don't Form Habits in Business.

Don't allow traditions, and a stock of spare parts of obselete drills to keep you from using progressive methods and up to the minute tools.

The McKiernan-Terry "Wizard" rock Drill is the last word in a piston rock drilling machine.

It has an air cushioning device on the end of the rifle bar.



It was found by exhaustive tests that a drill equipped with this device would use 25% less compressed air, and strike about 50% more blows per minute.

This cushioning device is a basic principle, patented.

Wizard Rock Drills are built to run. Don't be mentally lazy. Order one now, any size.

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District Offices:

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Structural Steel for Quick Delivery

We carry in stock at Montreal, 5,000 tons of Structural Shapes and are in a position to make quick shipment of either plain or riveted material for

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Estimates Furnished Promptly. Capacity 18,000 Tons Annually

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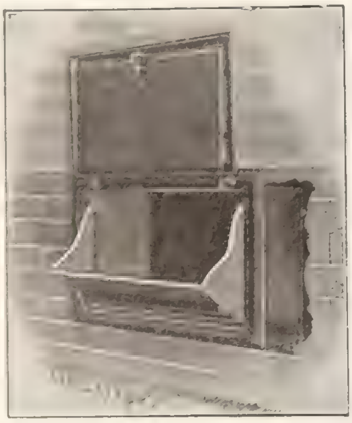


EQUIP YOUR CELLAR

with one of our "Majestic" Coal Chutes which the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

Send for our illustrated booklet, it shows and describes our full line of Coal Chutes

The Down Draft Furnace Co., Limited
Galt, Ontario, Can.

Montreal Representative: E. F. Dartnell, No. 8 Beaver Hall Square
Gorman, Clancey & Grindley, Agents, Calgary and Edmonton, Alberta

Montreal Residence — "Bestoslate" Shingles — J. A. Godin Architect

For Castle or Bungalow
—Specify this Roofing

You give to the owner a roof that is attractive—one that will not warp, rust, rot, split or crack under the most rigorous roofing conditions—it is weather proof, wear proof, decay proof—and fire proof.

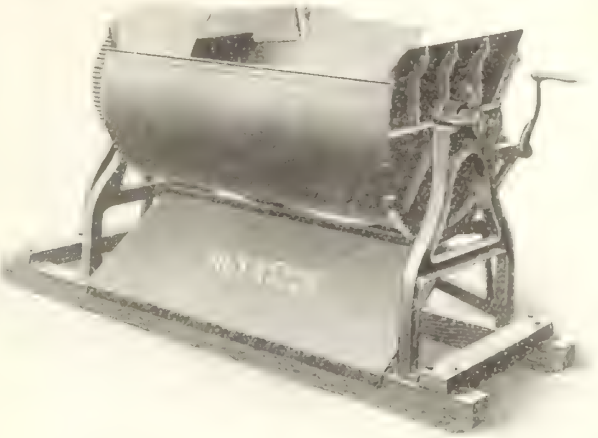
"Bestoslate"

shingles are light weight—call for light framing construction—may be cut or sawed—which means a saving in labor and material—no paint—no repairs, and a low insurance rate means another saving.

You will be interested in our catalog and Booklet CR giving information on asbestos building material—write for them NOW.

The Asbestos Mfg. Co., Limited
Eastern Townships Bank Bldg.,
Montreal.
Factory at LACHINE, P. Q.

Residence Montreal West — "Bestoslate" Shingles



Blystone Skid Mixer

One of the great features of this Batch Mixer is the simple but effective dumping device, worked by the crank handle on the right. Three turns forward dumps the material and three turns back replaces the mixer in position for the next batch. So accurately balanced a ten year old boy can dump it. A thoroughly efficient machine, it will thoroughly mix the concrete in minimum time and discharge the material quickly. The above cut shows the mixer ready for filling.

Catalogues sent on application

The Blystone Machinery Company
53 RAILROAD STREET
Cambridge Springs, Pa., U. S. A.

J. J. Turner & Sons
Peterborough, Ont., and Regina Sask.

THE LARGEST MANUFACTURERS AND DEALERS IN CANADA OF

Contractors', Surveyors' and Lumbermen's Supplies

Tents, Covers, Straw Ticks, Sleeping Bags, Grey Blankets, Oil Clothing, Nose Bags, Coal Bags, Snow Shoes, Toboggans, Moccasins, Flags, Awnings, Sails, Canoes, Row Boats, Paddles, Oars and every description of Camp Supplies. Sole manufacturers of the Walsh Window Tent for Consumptives. Send us your orders.

Prompt Shipments Guaranteed.

A Tale of Four Cities

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Building Permits

1911	$17,652,642
1910	13,150,365
1909	7,258,565
1908	5,950,883
1907	5,632,744

WINNIPEG
Building Permits

1911	$17,550,000
1910	15,116,450
1909	9,226,325
1908	5,513,700
1907	6,309,950

TORONTO
Building Permits

1911	$24,374,539
1910	21,127,783
1909	18,139,247
1908	11,795,436
1907	14,225,800

MONTREAL
Building Permits

1911	$14,579,932
1910	15,715,859
1909	7,785,621
1908	5,062,226
1907	8,406,229

showing the extraordinary activity of building operations in Canada's leading commercial and industrial centres. This is typical of the growth and development of the whole Dominion. **Do you want information** on all Building and Engineering projects contemplated or in course of construction throughout the whole of this country? **If so,** we can furnish you with **Daily, Detailed, Verified Reports,** obtained by our own staff of reporters, each one of whom is assigned a definite territory. These Reports will tell you who is buying, what is wanted and where the buyers are. They will tell you where there are opportunities for your making sales. Competition is keen—are you as well posted as your competitor or does he slip in just ahead and win out? Do you know what business is offering each day from every part of Canada. Perhaps there's a solution — **Perhaps** it's MacLean Daily Reports — think it over. Write to our nearest office.

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429 Pender St.
VANCOUVER, B. C.

You
Can
Save
Money
on
Your

Reinforcing Bars by using a
Hanson Bar Bender
right on the job.

Saves the extra freight and trucking expenses when bars are shipped bent. Handling and piling are facilitated at the job. Saves all bother and worry in case of change of plans.

Bends bars cold up to 1¼ in. square or twisted and 1½ in. round. Instantly adjustable.

Made entirely of steel forgings mounted on an angle iron stand, ready for immediate use.

A. P. HANSON & SON
619 West Adam Street, CHICAGO

Tenders Wanted

should be advertised for in the Contract Record "Tenders and For Sale Department." This paper is the "Tender Ad." medium of Canada and always brings bids from the reliable contractors and supply houses.

File your plans for any work you are inviting bids on, in our offices at Toronto, Montreal, Winnipeg or Vancouver.

Contract Record
Toronto Ontario

Save

75 cents a day on each Bricklayer

Possible with RENFREW LIME and you can lay 200 more bricks a day.

"Renfrew" will make more mortar per 100 lbs of lime and it sets very hard.

Bricks are easily bedded down when "Renfrew" Lime is used.

Try it, and be convinced.

"RENFREW"
the Lime of Quality

Jamieson Lime Co.
RENFREW, ONTARIO

White Lime - Stone - Grey Lime
Brick - Drain Tile

Leach Concrete Co.

We have successfully executed in the last 12 months a score of contracts for reinforced concrete construction.

General Contractors
Specializing in

Reinforced Concrete

and

Concrete Fireproofing

Specifications are invited from Architects and Engineers.

76 Albert St. - - TORONTO

Be Prepared

for any Contract that may come along, being sure that all your Equipment is RELIABLE.

WE MANUFACTURE

Dump Cars, Axles Wheels, Etc.

and our products have given general satisfaction.

Write for references.
Enquiries and correspondence respectfully solicited.

The Smith Foundry Co.

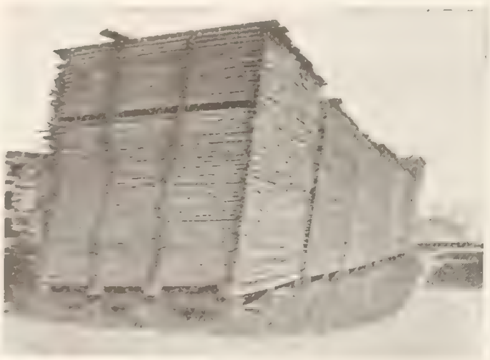
LIMITED
Manufacturers of Contractors' Needs of Every Kind.
FREDERICTON, N. B.

TOUGHEST OF THE TOUGH

THERE'S over two million feet of birch on the Watson yards. It must stand there for at least two years before being used. Every pile is numbered, dated, and a record kept of its condition.

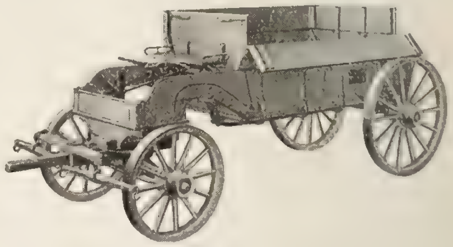
¶ You can hardly split a piece of birch straight. Try it and see. You will get tough, wiry splinters every time. It's the toughest of the tough. That's why we use it. Of course birch costs more than maple or yellow pine, but it's worth it.

¶ Any of the thousands who own old Watson wagons will tell you that. You always get AIR-DRIED birch in Watson bodies. Our word for that. Our output is a wagon every thirty minutes. The demand is often in excess of this. We only ask you to believe that we do ONE THING well.



¶ No other maker of dump wagons can put it that way.

Write for information



Watson Wagon Company

THE WORLD'S LARGEST DUMPING WAGON BUILDERS

CANASTOTA, NEW YORK

PITTSBURGH | ALSO OFFICES IN | PHILADELPHIA
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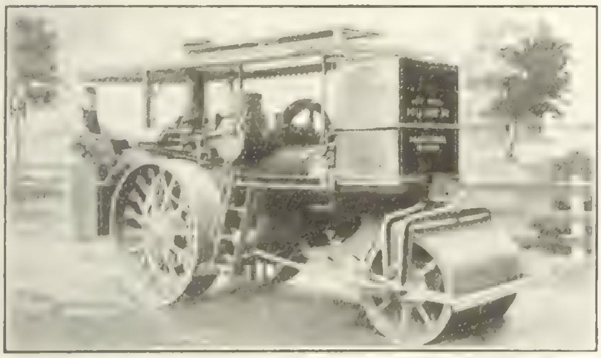
TIFFIN

Automatic Street Flushing Machines

THE TIFFIN WAGON CO.
TIFFIN, OHIO.

THE HUBER ROLLER



A Power Steered Roller. Guided by a straight lever from either side of platform. The easiest and quickest control on any roller.

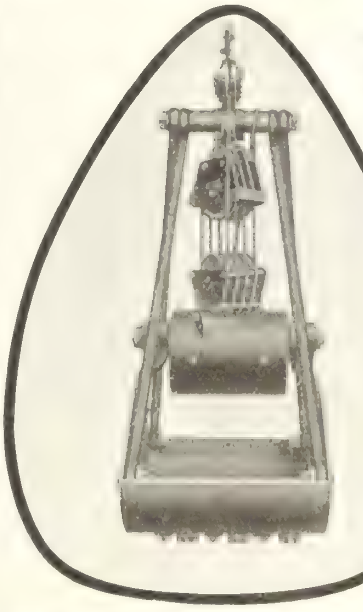
Engine mounted on the economical and powerful Huber return flue boiler.

Operates on the minimum of fuel and water.

The Huber Manufacturing Co.,
MARION, OHIO, U.S.A.
Canadian Representatives: F. H. Hopkins & Co., Montreal.

Genuine Economy in Contracting Equipment

The bucket that meets and overcomes unusual conditions, solves all hard digging problems and does it **economically,** will save expense in any contractor's equipment.



Because of the scientific construction of the

Owen Bucket

its weight and digging power can be adjusted so as to adapt it to the quality of material being handled as well as the equipment operating it. This means full loads, less wear and greater speed in operating.

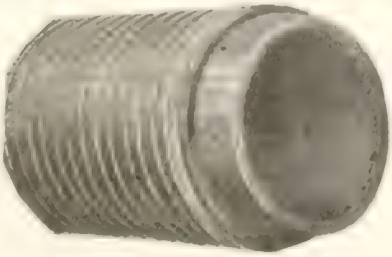
Will give better service with greater economy than any other bucket on the market.

Write for weights, dimensions and prices.

The Owen Bucket Company
529-531 Rockefeller Building
Cleveland, Ohio

Galvanized Wire Wound and Continuous Stave Wooden Pipe

FOR
Municipal and Private Water Supply
Direct Pumping or Gravity Systems
Power Lines, Irrigation and Mines
WILL NOT
Rust, Rot, Burst, Freeze or Taint

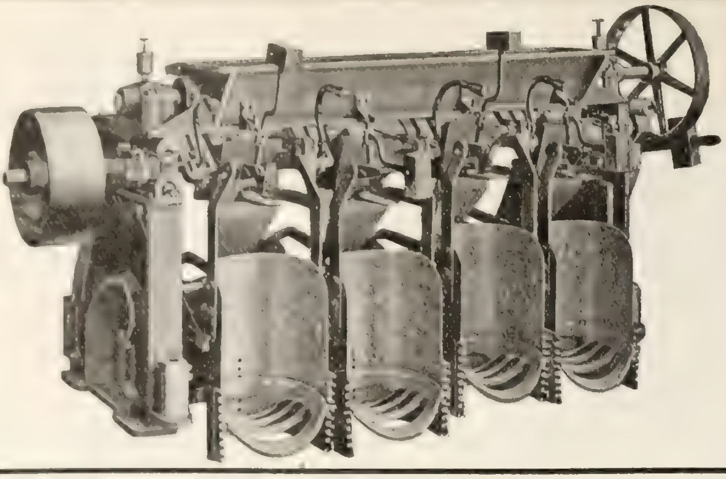


Withstands 200 lbs. Working Pressure
Unaffected by Acids or Minerals

Tanks, Water Works Supplies, Complete Water Systems Installed

WRITE US

The EASTERN PIPE AND CONSTRUCTION COMPANY, LIMITED, Alexandria, Ontario



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Lime Manufacturers

Let Us Pack Your Hydrate
with the Wonderful

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also Let Us Quote You on

PAPER BAGS

of every description

The Urschel-Bates Valve Bag Co.
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THE LUITWIELER SYSTEM OF PUMPING

Every Engineer should have a copy of our new catalogue.

It contains information not found in other pump catalogues.

The "Last Word" in the development of Pumping Machinery.

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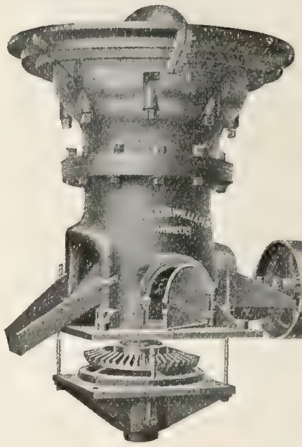
You can buy a Gyratory Crusher for less than you think.

Just investigate the

Bronze Ball Gyratory Crusher



It has been experimented on, developed and perfected by us. It will reduce the cost of your crushed product, by reducing the amount of power consumed, by the low cost for repairs and by the increased capacity.

You cannot afford to let this opportunity go by.

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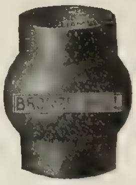

THE H. & E. PATENT BALL-BEARING LIFTING JACKS

For Railway and Bridge Work, Contractors' and Builders' Use

Made by practical Jack Builders. Material: best grades of malleable iron and steel Fully guaranteed as to durability and efficiency. The long even stroke of the lever together with the design and careful construction of the jack, makes it the quickest and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

To any responsible Firm or Railway in Canada any of these jacks will be sent on 30 days trial.

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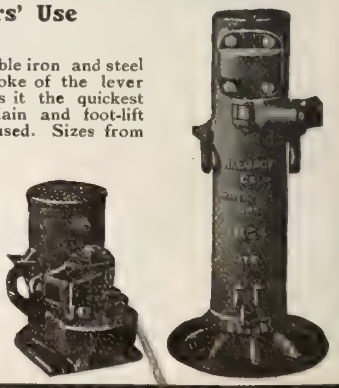
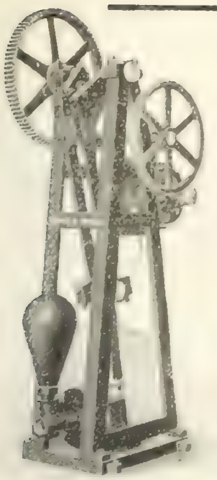
Waterville, Que.
Stock carried by F. H. Hopkins & Company, Montreal

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"ACME"
AIR WASHERS, PURIFIERS, COOLING AND HUMIDIFYING DEVICES.

Canadian Representatives
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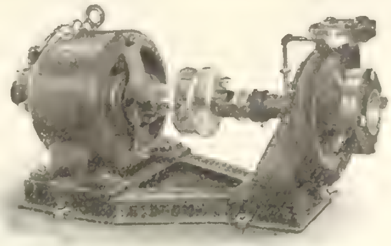
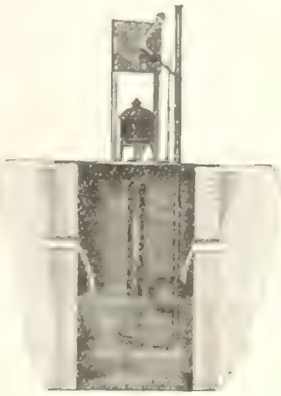
THE "ECONOMY" LINE

Automatic Electric Water Systems, Automatic Electric Protected Type Bilge Pumps, Automatic Electric Duplex Bilge Pumps, Automatic Steam Drive Bilge Pumps, Automatic Cellar Drainers, Automatic Sewage Ejectors, Deep Well Working Heads, Hot Air Pumping Engines, Vacuum Cleaning Apparatus, Sprinkler Filling Pumps, Automatic Condensation Pumps and Receivers, Triplex Plunger Pumps, Centrifugal Pumps, Single and Multi-Stage


Direct Connected Centrifugal Pump.



Manufactured by
THOMAS & SMITH, Inc. 116-118 N. Carpenter St. CHICAGO, ILL. 416 Broadway NEW YORK CITY

CANADIAN SELLING AGENT, JAMES J. MARTINDALE, 112 Mail Bldg., TORONTO.

Long and Short Yellow Pine B. C. Fir

White and Red Pine

Large Oak

Timber and Piling

James Sheppard & Son
Sorel, Que., Can.

Sturtevant Propeller Fans

For VENTILATING and COOLING

The design of our Propeller Fans is along the same scientific lines as all our fan product, and that is why Sturtevant Propeller Fans deliver more air for the same size fan and with less power expenditure than any other propeller type made. The construction is particularly strong and durable.

They will quickly change the air in factories, workrooms, kitchens, billiard halls, etc., carrying away the smoke, Fumes, hot air, keeping the atmosphere sweet and cool.

The electric fans are equipped with motors wound for either alternating or direct current.

Ask for Bulletin No. 116 K.

B. F. STURTEVANT CO., HYDE PARK, BOSTON, MASS.
J. A. McTaggart & Co., Winnipeg Polson Iron Works, Limited, Toronto
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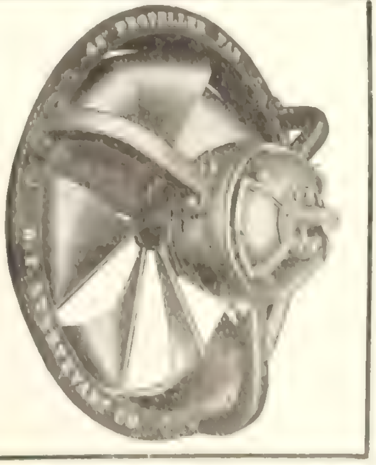

THOSE at all interested in the matter of fireproofing will find the little booklet mighty entertaining and instructive reading. It is unillustrated, free from sales arguments and theory. It has to do with the evolution of interior fireproofing, explaining concisely the methods employed and treatments in the production of products which totally obviates the necessity for wood or other inflammable trim in any part of a building.

These booklets are free for general distribution and are far better entertainers than salesmen. Your request brings a copy.

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The Dahlstrom Products

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Copper, Iron and Aluminum

With Weatherproof Insulation

WEATHERPROOF TRADE WACCO MARK WIRES AND CABLES

Slow Burning Wire

Slow Burning Weatherproof Wire

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TORONTO WINNIPEG REGINA CALGARY VANCOUVER

You Can Make a Hit,—By Handling

MIDLAND

Veneered Doors

1.—The best Veneered Doors Manufactured.
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4.—Good Variety of Stock Designs, in stock for immediate shipment.
5.—Factory Capacity unlimited; Up-to-date Machinery, Facilities and Designs.

Send Your Lists for Quotations. Catalogue Ready April First

Georgian Bay Shook Mills, Limited

Midland, Ont.

Wheel Barrows

For Every Purpose

We carry a complete stock of "Kilbourne & Jacobs" Barrows suitable for every requirement. These barrows will out-wear any other make and once you install "K and J" Barrows on your work you will use no other make. They cost no more and when you purchase barrows—you might just as well get the very best. We have a special Barrow Catalogue, which illustrates and describes fully every imaginable style of wheelbarrow—we want you to have a copy—it will surely come in useful—perhaps not now at the moment—but some day.

If you need barrows for your present work—tell us your requirements—we may be able to suggest a type of barrow which will be just what you always wished for. We have so many different styles—Barrows for

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Mortar Brick Sawdust Coal
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Drop Us a Line for Copy of Catalogue 30

F. H. Hopkins & Co.

MONTREAL

BRANCH OFFICES: General Supply Company of Canada, Ltd., Winnipeg Agents
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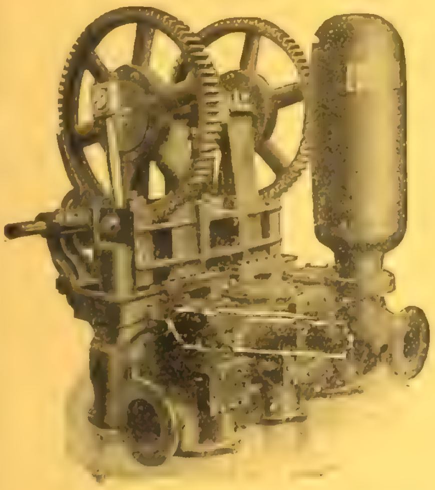
Vol. 26 Toronto, May 8, 1912 No. 19

ESTABLISHED 1886

Contract Record and Engineering Review



We Manufacture Steam and Power Pumps, Condensers, Travelling Cranes, Etc.

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"MADE IN CANADA"

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Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

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Air Compressors

OF BELLISS MAKE

have gained their reputation for

- Simplicity of Design
- Noiseless Running
- Compact Design
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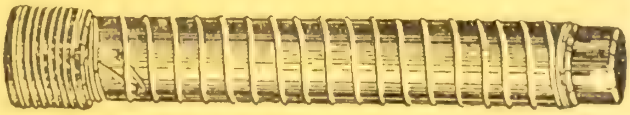

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for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

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WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished

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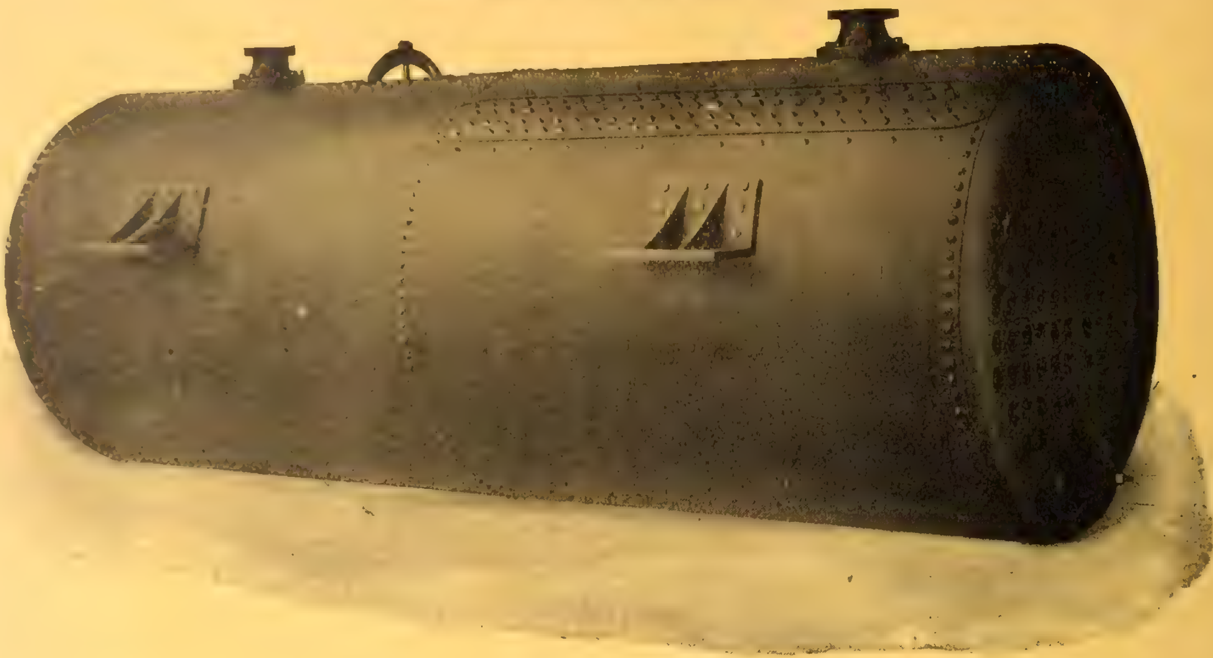

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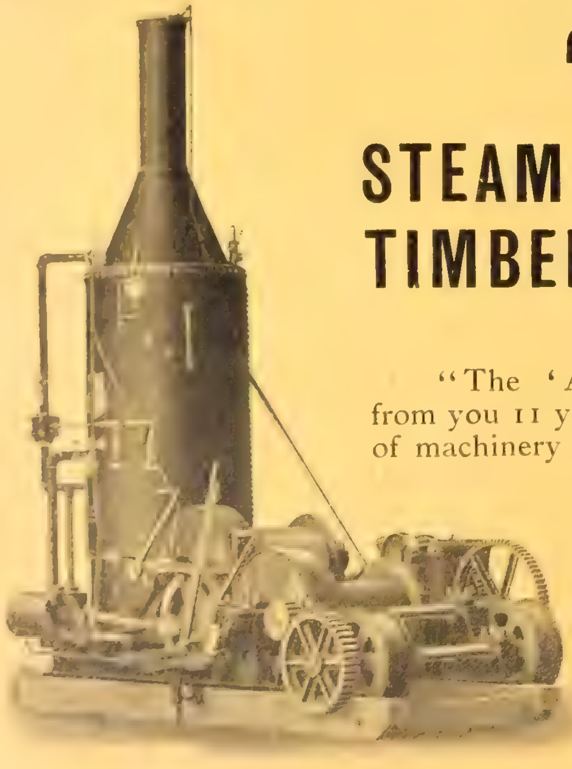

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STEAM AND ELECTRIC HOISTS
TIMBER AND STEEL DERRICKS
OF ALL CAPACITIES

"The 'AMERICAN' Derrick Engine purchased from you 11 years ago has been the most satisfactory piece of machinery I have ever owned.

"It has been in constant daily use with less than 10 dollars' worth of repairs
"W. G. LARUE, Duluth, Minn."

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Name......................................
Address......................................
Please send prices and information on
"AMERICAN" State
whether Engines, Derricks, etc.
AMERICAN HOIST
& DERRICK CO.
St. Paul, Minn.
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Vancouver Machinery Depot, Ltd., Vancouver, B.C.
Stuart Machinery Co., Winnipeg, Man.

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“Factories and Warehouses of Concrete”

THIS handbook of practical information on modern fireproof construction was compiled—at great expense—to fill a real want, to supply reliable data on a subject in which every architect, engineer, contractor or prospective builder is intensely interested.

That it has completely fulfilled its purpose is proven by the many words of appreciation from those who have read it, including editors of such technical publications as the ‘‘Canadian Engineer’’ and ‘‘Construction.’’

The cost of publishing this book was greater than any one company could well afford and its publication was only made possible by the “clubbing together” of practically every company in the United States and Canada, thus sharing the expense.

The book contains 224 pages, photographic reproductions of 230 buildings, interior views giving valuable suggestions for arrangement, fac-simile letters from owners and occupants telling their experience with concrete, and the most comprehensive article on concrete’s possibilities, and adaption ever written.

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Full data are given on the cost per square foot, per cubic foot, floor loads, window area, insurance, etc., for different types of structures.

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There are only a few copies left, so write for it now.
The book will be sent to Canadian Engineers, Architects, Contractors or Manufacturers upon receipt of 12 cents in stamps for postage.

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less, has fewer parts, takes less power, costs less to opera
a continual crushing and grinding motion.

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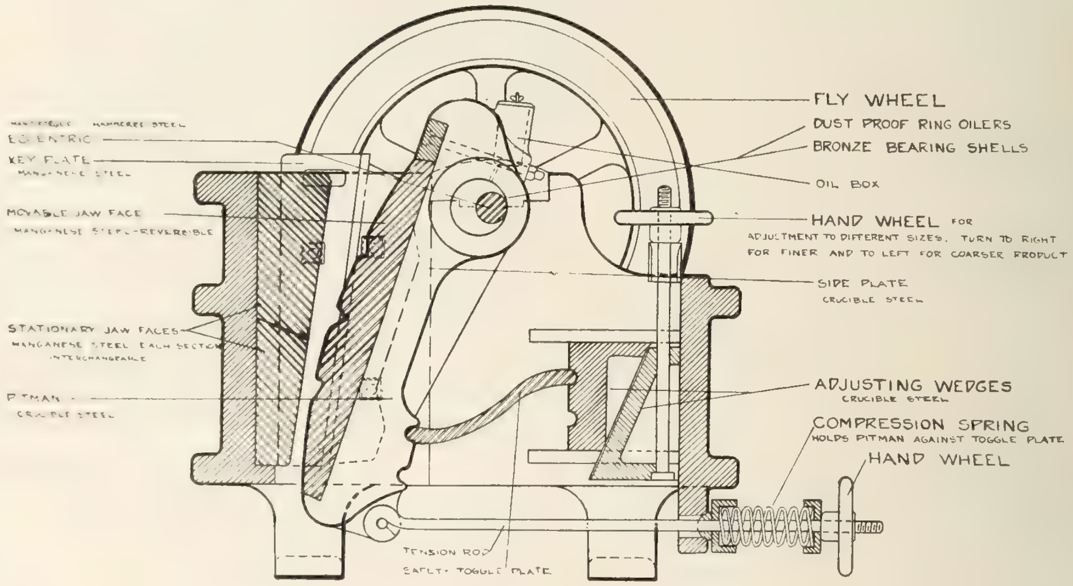

Table of Weights and Capacities

Weight, Capacity and Power Required for Various Sizes

No.	Weight Lbs.	Jaw Opening Corrugated	Jaw Opening Tapered for Gravel, Trap Rock, Fine Grinding	H. P. Required	Capacity Tons 2½ in. 10 Hrs.	Capacity Tons ¾ in. 10 Hrs.	Capacity Tons ¼ in. and Finer
1	550	4x6 in.	2½x6 in.	2 to 3		4 to 6	2 to 3
2	2,500	8x8 in.	5½x8 in.	4 to 6	25 to 30	18 to 22	10 to 15
2M	3,000	8x12 in.	5½x12 in.	5 to 7	40 to 50	25 to 30	12 to 18
3	4,300	8x12 in.	5½x12 in.	6 to 8	50 to 60	35 to 40	15 to 20
3M	5,500	8x16 in.	5½x16 in.	8 to 12	60 to 80	40 to 50	25 to 30
4	10,500	10x18 in.	8x18 in.	14 to 18	100 to 150	70 to 90	
4M	11,500	10x22 in.	8x22 in.	15 to 20	150 to 200	80 to 120	
5	14,500	14x20 in.	11x20 in.	18 to 25	200 to 250	90 to 130	
5M	16,000	14x24 in.	11x24 in.	24 to 28	250 to 300	100 to 150	

Montreal, 318 St. James St.
Toronto, 73 Victoria St.
Cobalt, opp. Right of Way Mine.

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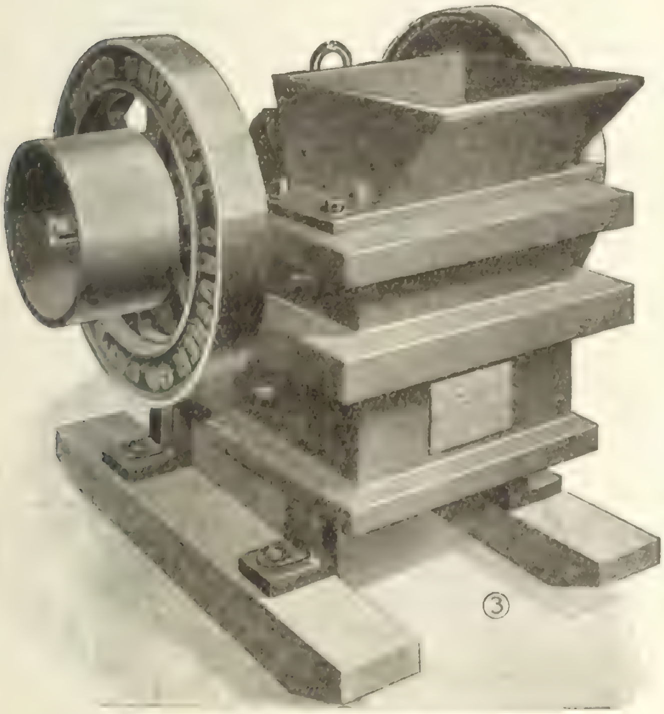
VELTEN
CRUSHER

lucing a uniform product without screening — weighs
d maintain works with a force feed and force discharge,

NOTE THE SIMPLICITY



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Actually requires only 5 to 7 h.p. to produce from 40 to 50 tons of 2½ inch rock, or 12 to 15 tons of sand, in a ten-hour day.

Will handle pieces 6 by 12, inches, crushing to any size.

Refer to table for further information.

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(Continued on page 12)

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Don Valley Porous Terra Cotta Fire Proofing, Foundation Bricks, Facing Bricks and Enameled Bricks Exclusively Were Used in This Structure

¶ These bricks have been the unanimous choice of discriminating architects and owners in competition with samples submitted by the leading brick firms of Canada and the United States. They are the only thoroughly vitrified facing bricks ever manufactured in the Dominion, and the most exclusive high-class pressed brick on the American continent.

¶ The above view is an illustration of one of the many important buildings in which this product is used.

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Most Mixing Least Fixing

The M-C Mixers don't even know the meaning of the words 'Repair Bills'

Most Mixing Least Fixing

Do You enjoy paying for the repairs on your Concrete Mixers?

Wouldn't you like to feel that your mixers were going to work throughout the season with all parts intact?

Wouldn't you like to turn into profit the money you spent last year on spare parts and repairs?

Get a catalogue of the Famous **M-C** "*Rail Track*" Mixers and study the details, — it is the details which count.

WRITE US TO-DAY

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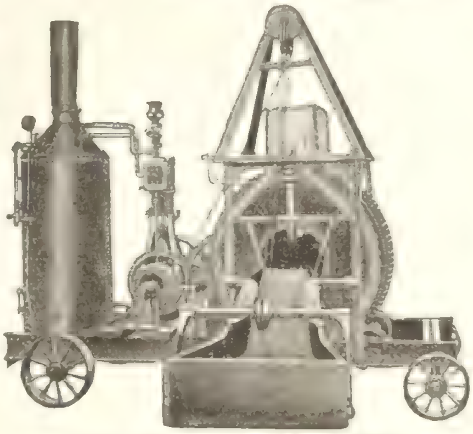
London Automatic Batch Mixer No. 1

It's a dandy 160 pages illustrations.

Showing the Largest Line of Concrete Machinery ever crammed into a catalogue.



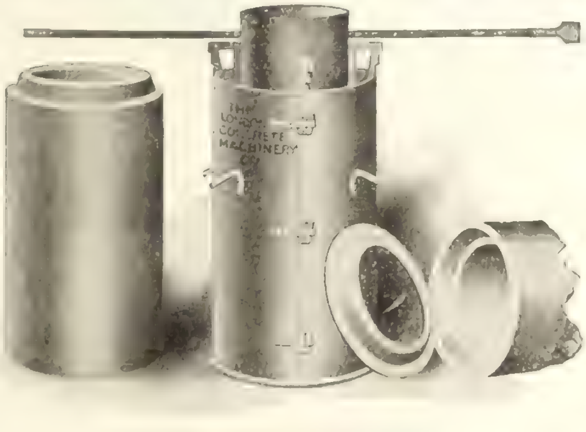
London Standard Drum Batch Mixer

All Made in our Own Factory and under a system producing an Excellence of Quality. Our large output Right from Factory to the Contractor.

Even at such remarkably low prices is preferable to exorbitant prices and small output.

Some people wonder how we can sell high grade machinery at such low prices.

IT IS QUITE SIMPLE



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We manufacture over twenty different sizes and styles of

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Mortar Mixers
Concrete Block Machines
Cement Brick Machines
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Tile Moulds
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Pumping Outfits
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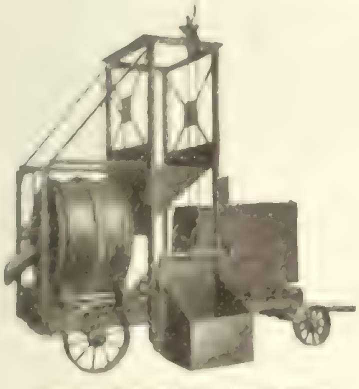
Concrete Carts
Wheel Barrows
Sill Step and Window Cap Moulds
A complete line of Cement Working Tools



London Paving Mixer with Side Lift and Rear Discharge

London Antomatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

Toronto Office: N.E. Cor. Richmond & Bay Sts.
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WETTLAUFER HEART-SHAPED MIXER

The Heartshape Drum

Famous for its QUICKNESS of operation

Quick Charging
Quick Mixing
Quick Dumping

The Heartshape Mixer

Strong Construction

Great Strength

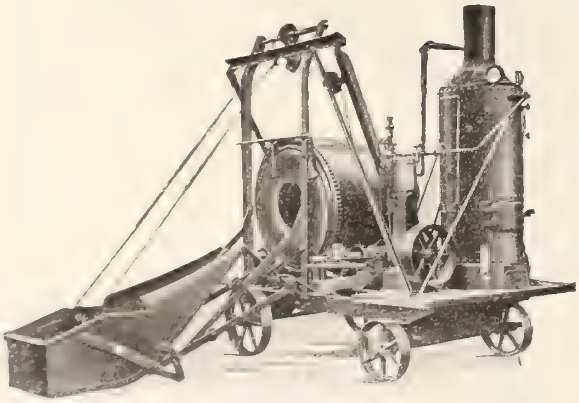
Long Life

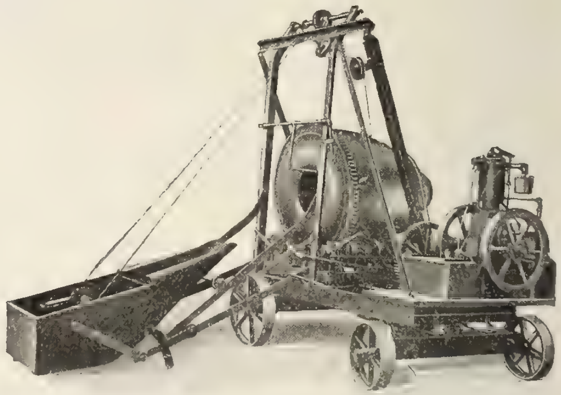
Perfect Work

YOU CAN'T GO WRONG

in buying a "Wettlaufer Heartshape Mixer." If there is an atom of doubt in your mind of these Mixers being the best on the market, come and see it working and we will prove conclusively to you that

IT IS THE BEST MIXER ON THE MARKET





The purchase of a reliable mixer of recognized make at the outset of a contract will save you money and time all along the line.

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

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We can guarantee delivery in any quantity. Write, phone or wire your orders.

Plants at Dundas and Vinemount.

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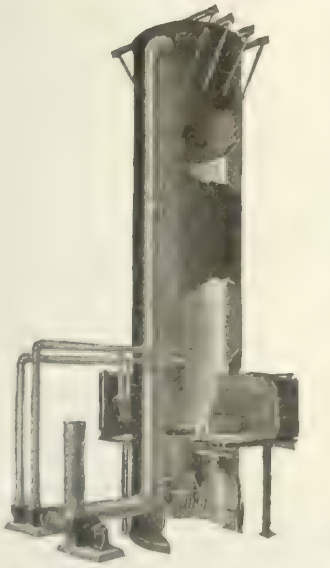

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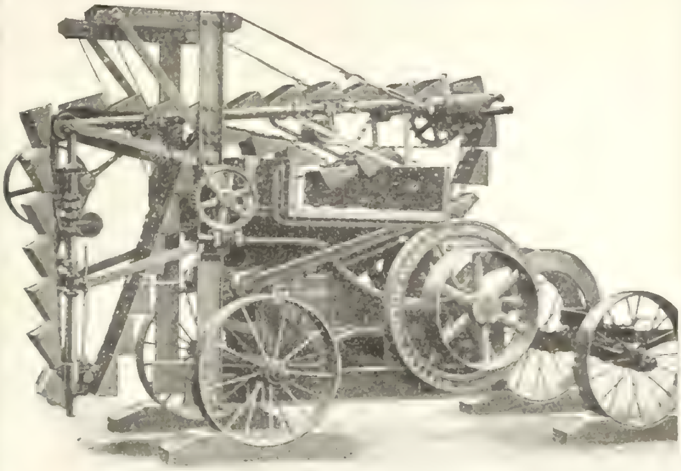

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Preserves Roads
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Mount Pleasant Cemetery Toronto. Roads built with Tarvia X in 1909.

Two Years' Trial in Toronto

THE above roadway in Mount Pleasant Cemetery, Toronto, was built with "Tarvia X" in 1909. The photograph was taken in the fall of 1911 and gives a fair idea of the excellent condition of this road, after two years of travel.

In the background this road has a five per cent. grade and if ordinary macadam had been used, the surface would be raveled and worn out long ago. The best demonstration of the success of Tarvia is that the Cemetery authorities, after two years, are going to use a great deal more of it, as the following letter from the Superintendent shows:

> Dear Sirs, February 14th, 1912
>
> I wish to let you know we will require "Tarvia X" to build about 6,000 yards of road this year about the end of July.
>
> I may say that we are well pleased with our Tarvia roads. The first that were made in 1909 have stood the test of traffic and heavy loads up to 16 tons, the wagon wheels leaving no impression.
>
> Where our roads have a 5% grade we find the Tarvia fills the bill, no washing, and are easy to sweep and clean in wet weather.
>
> (Signed) W. H. FOORD, Supt.

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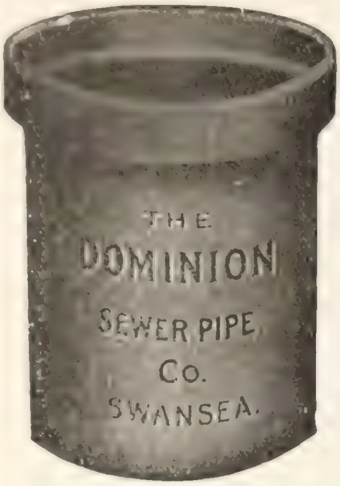

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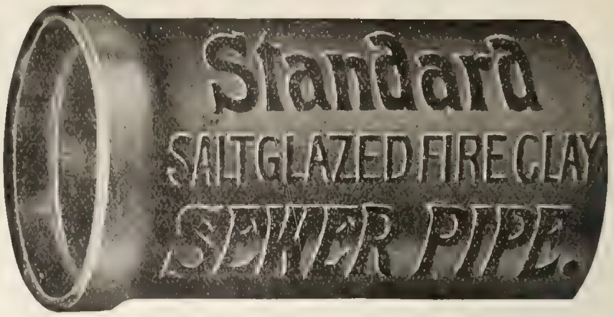

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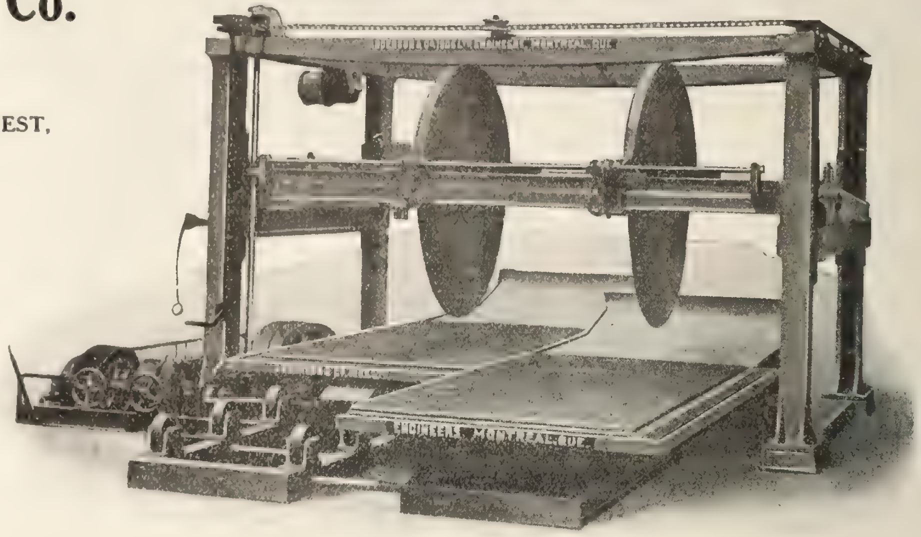

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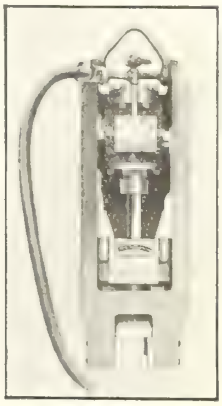

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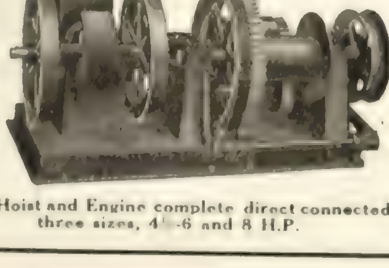

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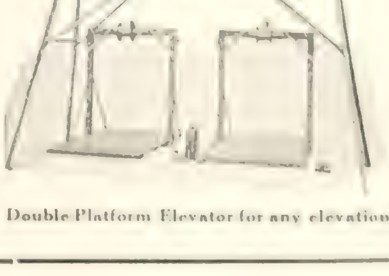

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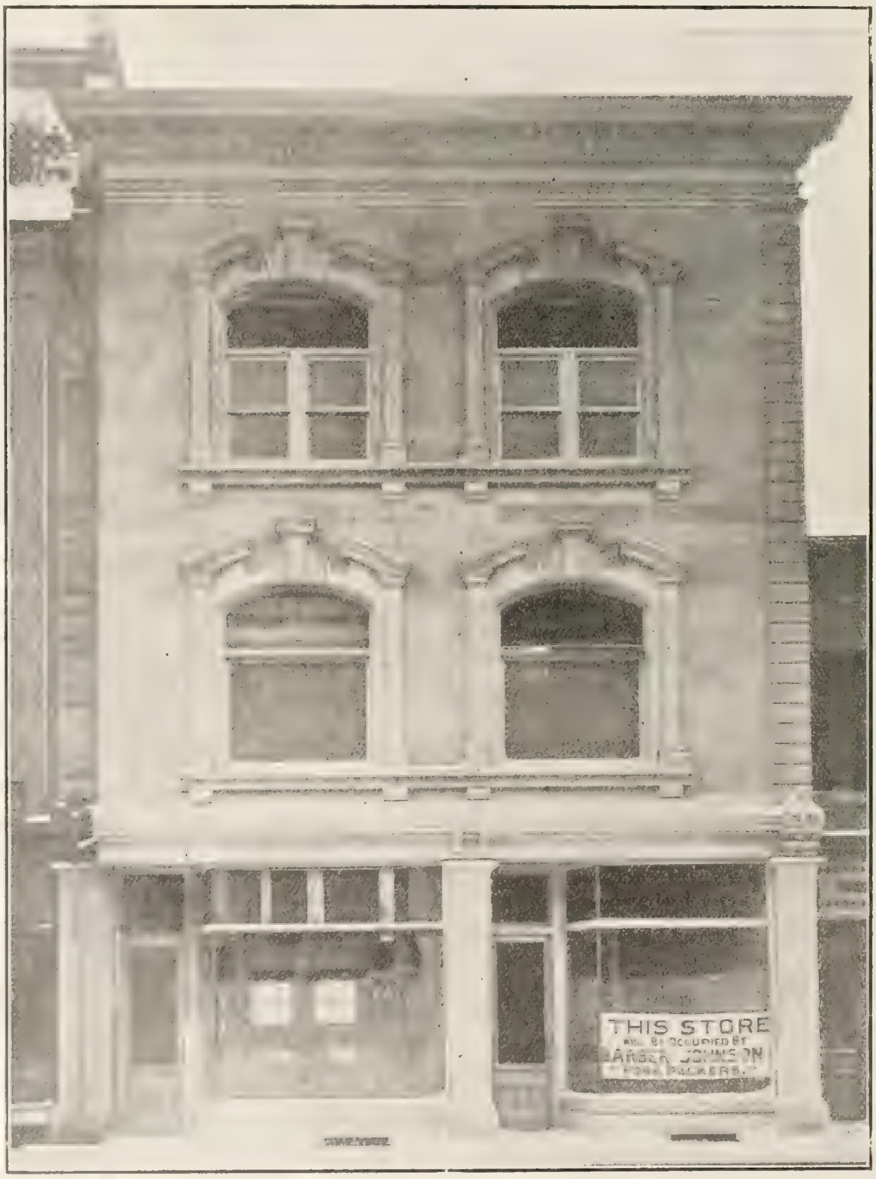

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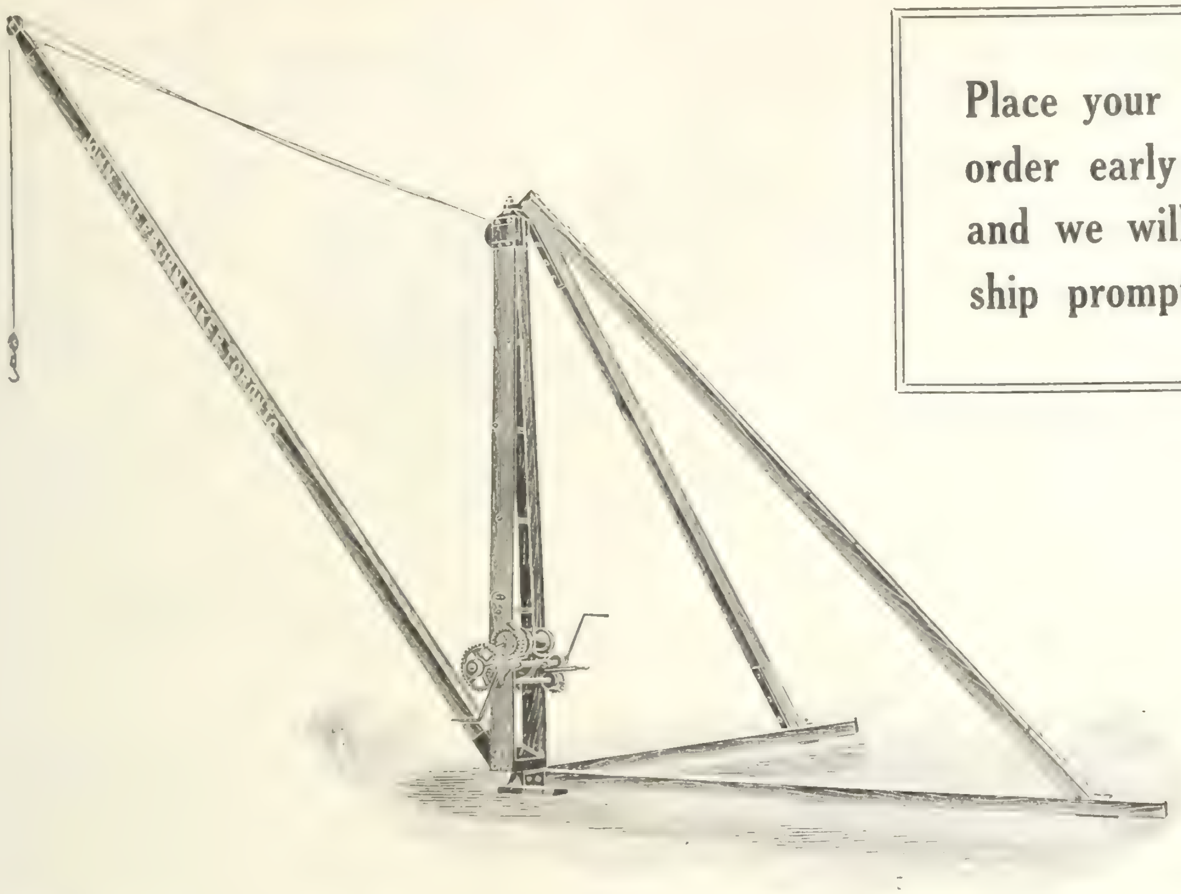
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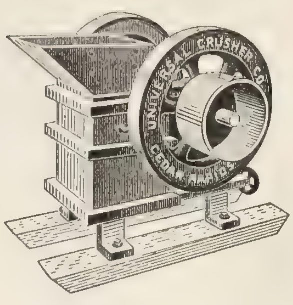

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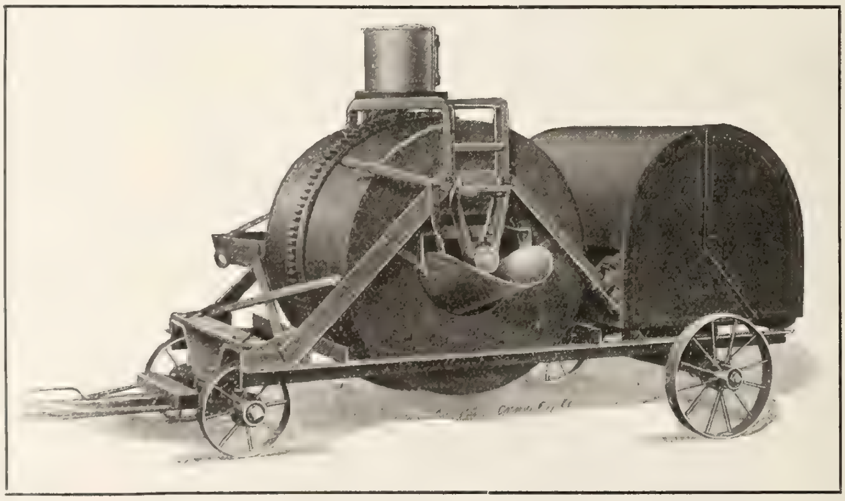

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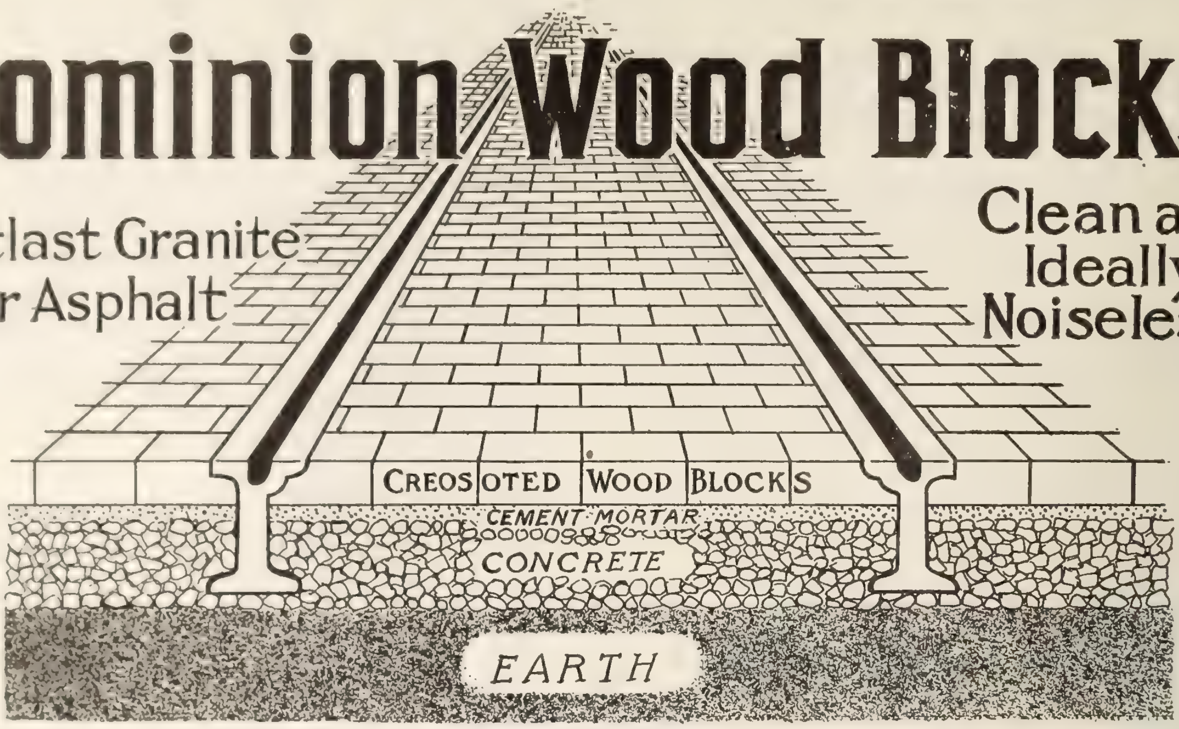

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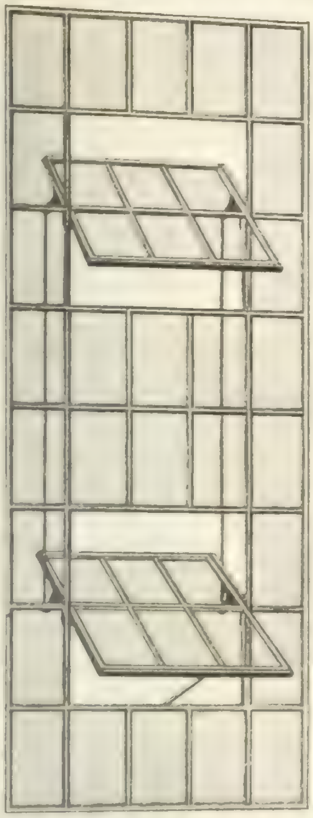

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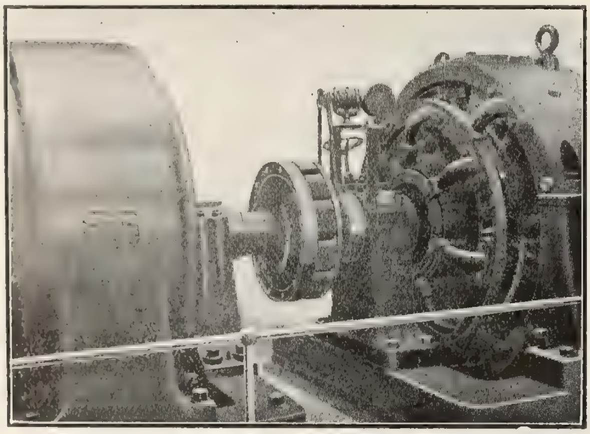

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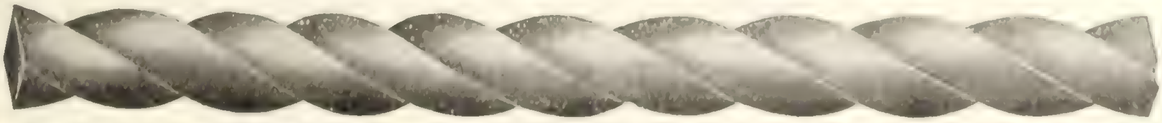

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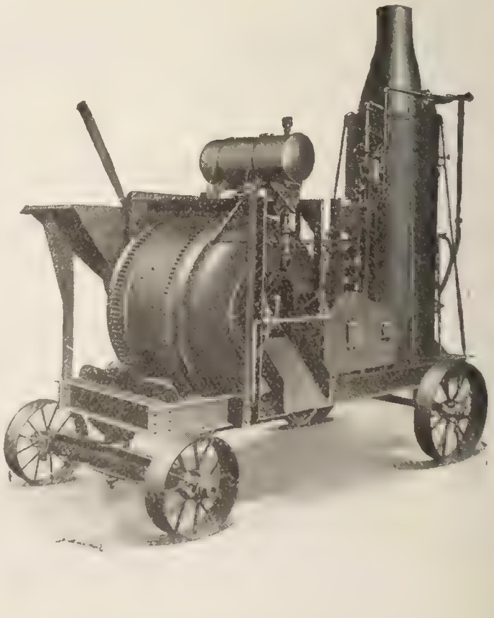

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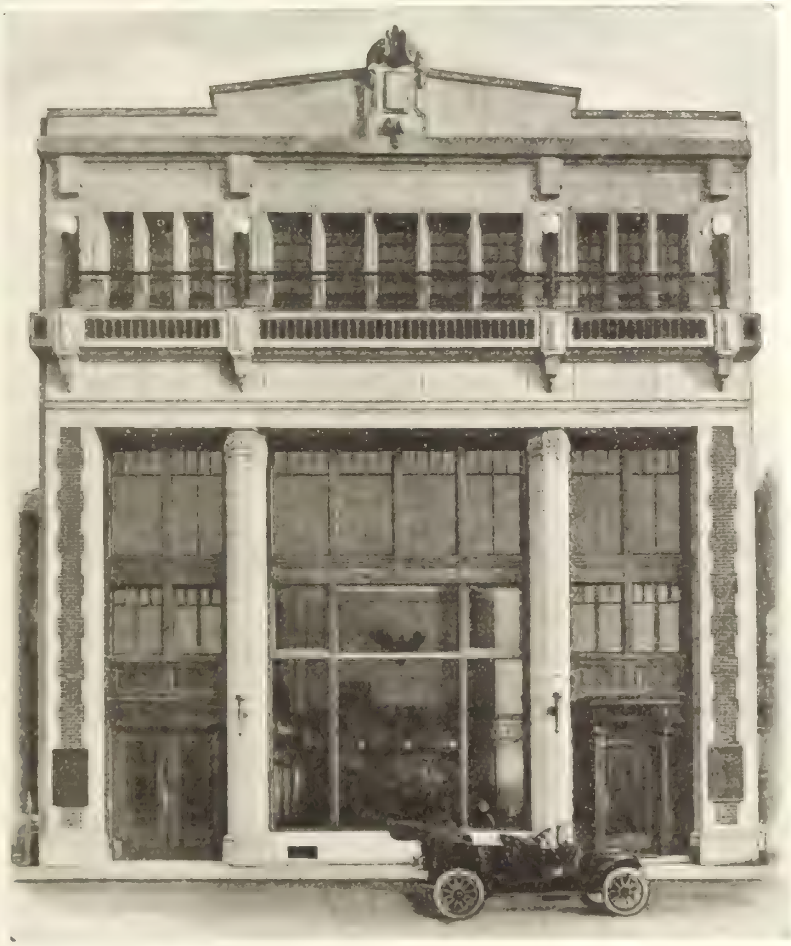

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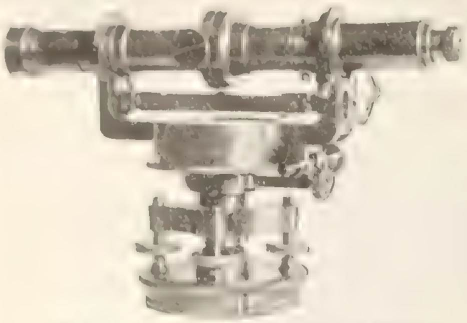

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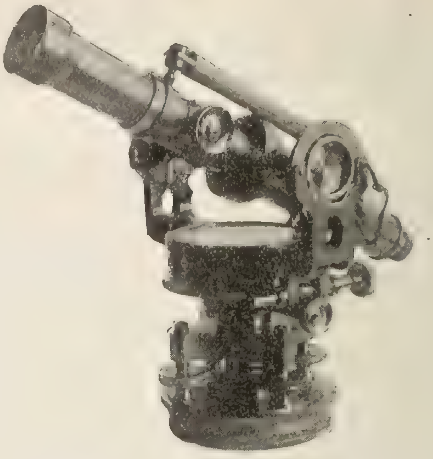

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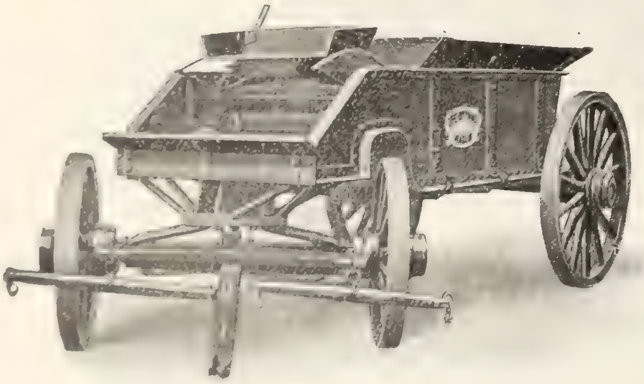

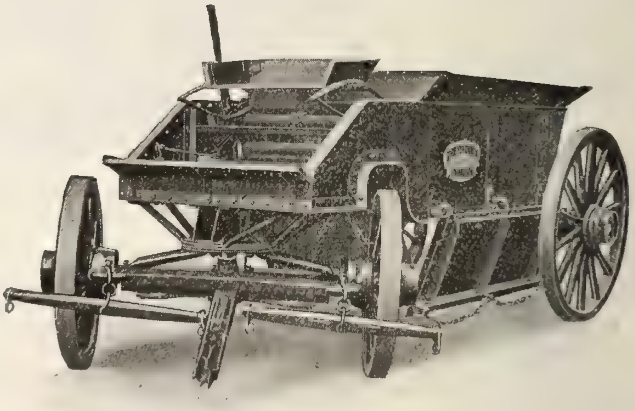

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A Few of the Lines We Manufacture

All this is now overcome. After long and costly experimenting our experts have now perfected a tube made of a special compound that resists oil and the heat developed by air compression. It neither chips, hardens nor cracks. And when other hose begins to ***play out,*** this hose is as ***good as new.***

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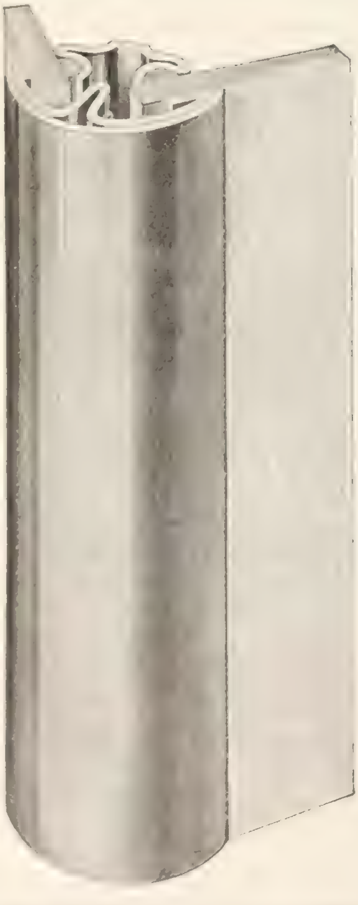

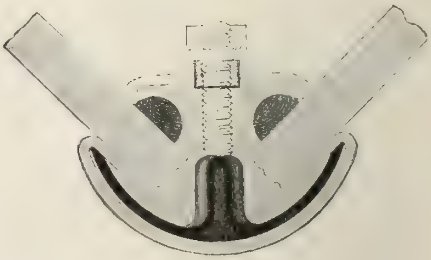

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No. 10

The One Perfect Bar

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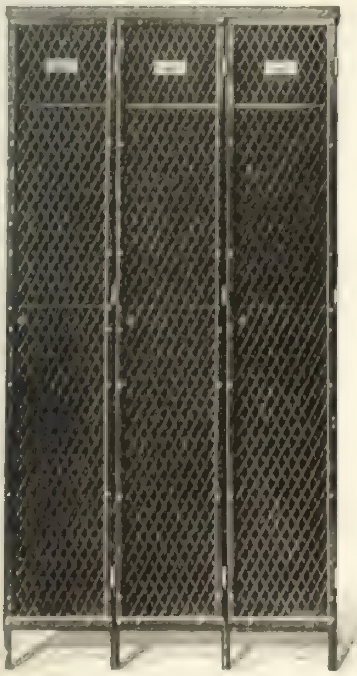

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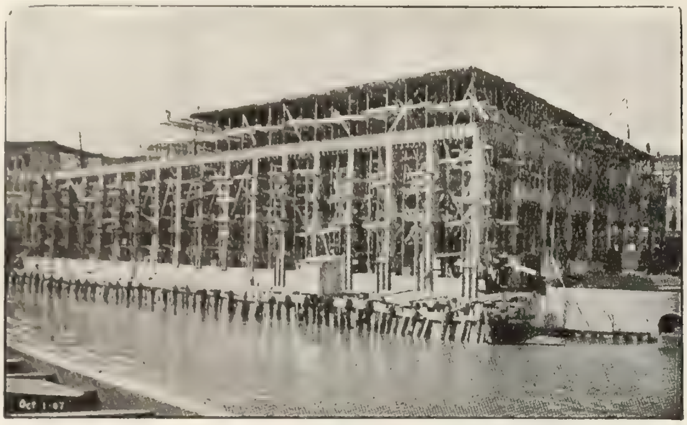

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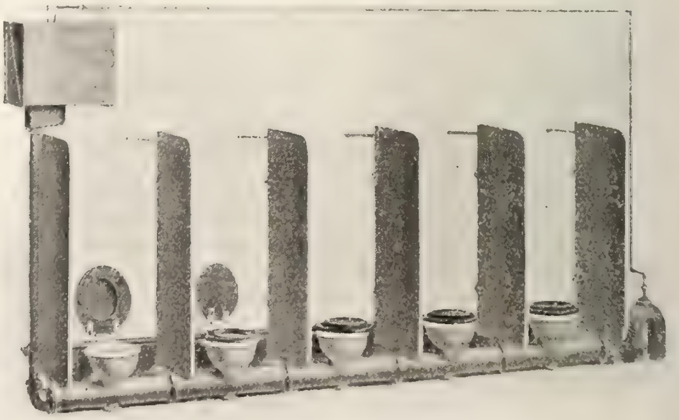

Plate F. 517

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Engineering Ethics

THE code of ethics which has been proposed for adoption by the Massachusetts Society of Civil Engineers is reproduced in another column. This code is intended to establish general principles of professional conduct and has been drawn up with sufficient care to warrant some notice in the Canadian field. In the main, the code is to be commended as a whole, but in particular it is notable for the candor with which it discusses the subjects of criticism and advertising. In professional circles one hears only too often the veiled insinuation regarding the capabilities of a fellow practitioner: such a man designed a sewerage system that proved hopelessly inadequate; so-and-so built a bridge that failed; another is putting in a filtration plant that is radically wrong in its design, while still another is so incompetent that his name may be dismissed with a shake of the head. This sort of thing is most common among the mediocrities of the profession: the man with a reputation worth while cannot afford to risk it in gratuitous criticism. But even among the weaker members such pleasantries should be discouraged, for undoubtedly what reflects upon the individual members of a profession brings discredit to that profession as a whole. The man who is generally the most free with destructive criticism is as a rule himself incompetent and is only too glad of the opportunity to divert attention from himself.

Then as to advertising.—It is set forth in this Code that engineers "should avoid as much as possible any impression of commercialism." This raises the point as to just when and how an engineer may advertise himself. Every man speaks from his own standpoint, of course, but we cannot think that there is any more effective way of advertising than by contributing articles of outstanding merit to the technical journal. The selection of the journal in which the article is to be published should be made with some care,—indeed, an intimate knowledge of the journalistic field is undoubtedly a sine qua non in present-day engineering practice. The municipal engineer should contribute articles to that periodical which reaches the greatest number of city engineers interested in his work. It will be in the interests of both himself and the city he is serving if upon the completion of any important work he will prepare a careful and concise descriptive article, accompanied by the principal details and outlining the main features of design and construction. In doing this kind of work the engineer is pursuing a dignified course that is the best possible advertising. If his articles have any real merit he is not only bringing his name before the municipal world in its most favorable light, but he is promoting the best interests of his city and contributing something, perhaps, to the advancement of engineering knowledge. And in addition to all of this he is instituting a permanent record of his works which will perhaps be most valuable as a ready reference for another and a better position.

The Engineer's Opinion Paramount

THE manner in which the engineering profession is left in the background when the first considerations are being given to the inauguration of public works, was the subject of comment by Mr. Rudolph Hering at the recent annual meeting of the American Institute of Consulting Engineers. Mr. Hering observed in this connection:

> "Instead of finding representative members of the engineering profession who by their special knowledge and experience are specially well fitted to pass upon questions of the practicability of public works, as regards their most efficient design, operation and economical cost, the adjustment of practical means to ends and the ascertainment of investment values, we generally find on such commissions men prominent in commercial pursuits or in the legal profession. While such men generally bring to bear upon the question arising in projecting works, excellent experience within their special activities, there is too often a lack of those important qualifications which can secure the best financial results and the best permanent efficiency.
>
> "Contrary to this custom in our country we find in Western Europe that engineering training and experience is paramount, not only in questions involving the construction and practical management of great public works, but also in their original inception, general planning and design. While in our country we have recognized the advantages of engineering co-operation in large private enterprises, chiefly in transportation and manufacture where efficiency and economy are of great financial importance, we do not in the same degree recognize the same advantages in our public enterprises, the lack of which recognition causes wastefulness and inefficiency sometimes to an astonishing degree. As yet the great natural wealth of our country and the proverbial good naturedness of our public do not seem to have necessitated the same early advent of an equally rigorous, efficient and economical public service."

Mr. Hering's observations should furnish many of our Canadian municipalities with food for thought. Toronto has proved the folly of subordinating engineering experience to popular opinion. Unfortunately the men who comprise Toronto's governing body have not the experience which usually goes with prominence in commercial and other pursuits. Had Mr.

Having come very much in contact with the members of our city councils he would undoubtedly have modified still further his judgment concerning the general value of the experience possessed by men comprising such bodies.

The Hazard of Upstream Dams

IN commenting upon the failure of the Erindale Power Company's dam, an account of which by Mr. F. F. Longley (Resident Engineer, Toronto Filtration Plant) is given elsewhere in this issue, the Engineering Record remarks that the important thing to observe is that the giving way of one dam may lead to the failure of others lower down the stream, under conditions which are not ordinarily taken into consideration by engineers in designing such structures. The engineer customarily designs the spillway to discharge the maximum probable runoff from the drainage area above the dam, without the water behind the structure rising to a height which will put it in danger of being overtopped. This is the rational procedure, but unless the construction of feeble dams can be prevented by some competent authority, the rational precedure is inadequate and the engineer is forced to supplement it by guessing the extent of the danger which may be caused by the giving way of some weak affair farther upstream when the heavy floods occur. By going out under such conditions it will add the water stored behind it to the peak of the flood and produce abnormal stream conditions, which cannot be accurately estimated and can only be guessed at. The situation is one which cannot be emphasized too strongly as dangerous, and is a particularly good argument for state regulation of the design of dams.

Common Faults in Photographs Selected to Illustrate Technical Articles

GOOD illustrations for technical articles always are desirable. They add to the appearance of an article, lighten up the printed page, and, what is of greater importance, they convey ideas of methods and conditions which could not be so concisely presented by descriptive matter. These points doubtless will be conceded by any reader or writer who has given the matter thought. Writers, however, seldom employ sufficient care in the selection of views to make them of most value as illustrations.

Editors find that many photographs which accompany contributed articles must be rejected because they do not show anything in sufficient detail to justify their publication. The mistakes made in taking pictures on a construction job may be divided into two general classes, namely, uninteresting things are photographed, and interesting things when photographed often are crowded into a corner of the picture and blended with the distant landscape, while the foreground of the view is filled with an object or objects of no interest whatever. Two examples will be given to illustrate the points just mentioned.

As an example of uninteresting things which are photographed and sent in with contributed articles elevated water tanks on steel trestles may be mentioned. These tanks are so common and so much alike in the general views which are readily photographed that a journal addressed to engineers and contractors will seldom find such views acceptable for publication. Notwithstanding this fact, which must be apparent to all, practically every article on waterworks offered to this journal, on jobs where elevated tanks were erected, is accompanied by an excellent view of the equally excellent tank. Such pictures lack the element of novelty, are therefore uninteresting, and must be rejected. All standard machines, tools, and forms of construction which are familiar to all must be included in this class of uninteresting things from the present point of view.

As an example of the manner in which interesting features often are pushed aside to make room, apparently, for objects of no interest, the view of a crushing plant recently submitted may be mentioned. The arrangement of the plant, as stated in the text, held some features of interest which were worth showing. However, a study of the view showed that in reducing it to the width of two columns, 5 inches, the cut would be divided as follows along its long dimension: One team and wagon 2½ ins., distant cathedral 1½ ins., stone crushing plant and appurtenances, 1 in.

Editors appreciate the fact that in many cases such views were not taken for the purpose of illustrating technical articles, but for the records of the engineer or contractor on the job. In general, however, the same principles apply to both cases. The selection of views on a job which are to be photographed is a matter of more than incidental interest and importance, and should be given consideration consistent with the value of good pictorial records.—Engineering & Contracting.

Mr. C. H. Rust and the Toronto City Council

At a meeting of the Toronto City Council last week, the resignation of City Engineer Rust was accepted. Mr. Rust will receive a bonus of six months' salary, amounting to $3,000, upon his departure. The following resolution was carried by the members of the Council:

"In accepting his resignation this Council desires to record in its minutes an expression of its high appreciation of the valuable services rendered by Mr. Rust during his incumbency of the respective positions of assistant city engineer and city engineer, and extending over a period of 35 years.

"His term of office has been singularly successful. His career has been marked by the initiation and successful completion of many important improvements, all of which abundantly attest his sound judgment and engineering skill of so high an order as to win recognition for him as one of the most eminent of authorities on municipal engineering on this continent.

"This Council desires further to convey to Mr. and Mrs. Rust, and the members of their family, its earnest wishes for their continued health, happiness, and prosperity."

Several years ago reinforced concrete was tried in the form of sleepers by an English railway company, and the result was satisfactory. Now three companies—the London and Northwestern, the Great Northern, and the Great Eastern—have utilized reinforced concrete for fence posts. As is well known, creosoted wooden posts require renewing, their life not being more than some twenty years. On the other hand, reinforced concrete has a much longer life, being in fact practically imperishable, so that, even if its first cost is greater, its advantages counterbalance first economy. The cost of such posts runs out at about 13 cents a foot lineal, and in cases where cement, iron, and sand are cheap locally the cost of reinforced concrete posts is less than that of creosoted wooden ones.

Letters to the Editor

Should a Dozen Firms Figure the Same Quantities?

Toronto, May 3, 1912.

Editor Contract Record:

I have followed with interest your discussion of the above subject. I am in favor of a Bill of Quantities as a basis of contract—this Bill to be the work of a competent quantity surveyor and measured according to the usual methods of the country with an adequate description of the material used. Take for example plasterers' work. The clauses from the specification affecting the plasterer are first given:—the sand, lime and cement; where obtained; the proportion of same and the name of the manufacturer—in fact all the information that would affect the price of the finished work. Then follow the quantities:

Yds.	Ft.	Superficial			
1000		do	Lath, plaster, float and set partitions and ceilings		$
35		do	Labor only to No. 7 openings in same		
	60	lineal	16 inch girt fine plaster moulded cornice . . .		
		No. 20	Mitres in same		

At the end of the Bill comes:

Allowance for contingencies to be expended or deducted		$20.00
Add for lithography		10.00
Add for quantities 2½% to be paid out of first instalment		
Total Plasterer....		

The average time that it takes to measure up a job in this manner by a man who is fully conversant with the details, including the lithographing of the Bill, is about three weeks for a $10,000 house. It would not take much longer in the case of a skyscraper because the number of items is about the same in each case, although the quantities would be greater of course. It is impossible for a contractor to spend this time on a job. Therefore he adds a sum to cover contingencies, where there are no quantities to guide him. If he is afraid of keen competition he will cut out this contingency sum altogether—and thereby hangs the tale of the failure of many contractors. Where quantities are furnished these failures are reduced to the possibility of a clerical error in figuring, or to the risk taken by the contractor with his eyes wide open.

Where a Bill of Quantities is provided, the following clause is added to the contract form:

"Should any error appear in the Bills of Quantities other than in the contractor's price and calculations it shall be rectified and such rectification shall constitute a variation of the contract and shall be dealt with as hereinafter provided."

Most quantity surveyors will guarantee the correctness of their quantities, but this guarantee is unnecessary, as will be seen from the above clause. Upon completion, the work is generally measured up by both parties and a settlement made on the spot. A case in point in my experience was where the mason claimed that sufficient stone had not been given him in the quantities. I argued to the contrary and offered to go down to the job and measure it up, but he decided to accept my quantities.

The case for quantities is established by the fact that it costs the building owner nothing, the explanation being that contractors are putting their figures on definite quantities and are thereby reducing their tenders by more than the 2½ per cent. commission. The builder does not pay for the quantities because he adds 2½ per cent. on to his tender. Then who does pay? It is just the difference between a guessing competition in a contractor's office at midnight and the steady work of a quantity surveyor for three weeks. Incidentally this system opens up a new field of industry.

I can well understand that many successful contractors would prefer to have things continue as they are, but from a wider viewpoint and having in mind recent experiences of factory work, the furnishing of quantities would be a distinct advantage. I know of contractors who should have had several thousand dollars more to make their jobs pay decently, but in order to secure their contracts they cut their prices and made omissions that would probably have ruined a smaller man.

As to an examination of the plans it is impossible for a contractor to master in a few hours a set of blue prints that have taken two months to prepare.

It seems to me that the furnishing of quantities upon a businesslike basis would be advantageous and would practically eliminate the element of chance.

Yours very truly,
S. H. Penlington, A.R.I.B.A.

Quantity Surveyors not Required by Contractors with Well Organized Office Forces

Winnipeg, April 27, 1912.

Editor Contract Record:

We have never worked under the system of quantity surveyors, which seems to be in vogue in the Old Country, but no doubt it has its advantages, although the quantities would have to be guaranteed by the owner. We find that in taking off the quantities in our office, a man becomes more familiar with the class of work required, and will estimate accordingly. Of course the conditions attending the work enter largely into the cost of putting the materials in place. However, we believe that if the quantities were given out with the plans and specifications, and were guaranteed by the owner, and if the contractor were given the use of the plans and specifications so as to familiarize himself with the conditions and the class of construction before putting in his price, no doubt it would be very satisfactory and quite an assistance to most of the contractors. But we cannot see where it would be of much value to contractors with well organized office forces capable of taking off quantities.

Very truly yours,
W. H. Carter
Carter-Halls-Aldinger Company, Ltd.

The largest crane in the world, according to "Engineering," is the one which has recently been erected for the Imperial Japanese Navy at the Kure dockyard. It is constructed to lift a working load of 200 tons at a radius of 105 feet, 100 tons at 150 feet, and 50 tons at 160 feet.

A Transcontinental Highway for Canada

The Canadian Highway Association's Great Project and the Men Behind It — British Columbia's Important Part

THE trend of modern times is towards improvement, whether this be in moral, social or natural conditions. In the natural sphere, perhaps no improvement has been more marked than that which has taken place in recent years in the building and maintenance of roads. It is only a few years ago that Canadian roads almost everywhere were a disgrace; to-day they are rapidly approaching a standard which at least can be described as fair, if not good. And the day is rapidly coming when the term "Good Roads" can be applied with equal truth to the highways of British Columbia, to the highways of Nova Scotia and to the highways of the seven intervening provinces.

The Yale Road, near New Westminster, B. C., where the Canadian Highway winds through a dense forest of giant pines and cedars

A few months ago the Canadian Highway Association was formed in New Westminster, B. C. About a hundred good roads enthusiasts started this organization, electing Mr. W. J. Kerr, a real estate man, of New Westminster, as President. Young, lusty and vigorous, the Canadian Highway Association has already done a great deal towards the improvement of roads, more particularly, perhaps, with regard to the roads in British Columbia, where this organization has its present headquarters. The officers of the association have used their influence with the members of parliament, with the mayors and aldermen of cities, and with the reeves and councillors of municipalities, with a view to getting road conditions bettered.

It is the aim of the Canadian Highway Association to further the construction of a transcontinental highway from Halifax, N. S., to Alberni, B. C., a distance of 4,000 miles. Not by the building of this road, for the cost is prohibitive insofar as private enterprise is concerned, but with the assistance and cooperation of the districts, municipalities and provinces concerned and with the help of the Dominion Government. The actual work of construction will be carried on in the future as in the past, but there will be a definite object in view, something which has been lacking in Canada ever since road building commenced. There will be objective points on the east and west coasts of Canada, and all work will be done as a part of the great scheme known as the Canadian Highway. Speed the day when the dream of a transcontinental highway becomes an accomplished fact!

Mr. W. J. Kerr, New Westminster, B. C., President of the Canadian Highway Association

The men behind the Canadian Highway Association believe in the ultimate success of the enterprise. They are men who do not enthusiastically espouse a cause, later to allow their ardor to cool and their interest to lapse. To them the Canadian Highway is more than a hobby; it is a trust.

Hon. Thomas Taylor, elected Honorary President of the Association, is in strong sympathy with the movement, and his position as Minister of Public Works for British Columbia enables him to do a great deal for the cause. His sobriquet, "Good Roads" Taylor, has been well earned in past years, and his intentions as to the future will work out in practice in such a manner as to further cement the association of the name and the man.

Mr. W. J. Kerr's election as President of the Association was a fitting tribute to the work he had already done for good roads. Being a real estate man—and a successful one—Mr. Kerr long since realized the need for better roads. His business takes him all over the Fraser Valley, and no man knows more of the requirements of this fertile district. He first showed his interest in the campaign for better roads by becoming affiliated with the Pacific Highway movement, and last year he was one of the two British Columbia men attending the annual meeting in Portland, making the journey in an automobile.

The list of British Columbia Vice-Presidents is made up of men well known on the coast, and includes

Mr. A. E. Todd, of Victoria, whose name will long be associated with highway improvements in Canada and along the American Pacific Coast. The other vice-presidents are: Mr. A. J. McCandless, Vancouver; Mr. A. E. White, New Westminster; Mr. T. J. Armstrong, New Westminster; Mr. F. Bowser, Point Grey; Mr. L. E. Marmont, Fraser Mills; Reeve Nicholson, Saanich; Dr. Elliott Rowe, Vancouver; Mr. Charles A. Ross, Vancouver; Alderman Pratt, Medicine Hat; Mr. Reginald V. Harris, Halifax; Mr. R. A. Ruttan, Port Arthur, Ont.; Mr. Victor Parker, Winnipeg, Man.; Mr. J. W. Fleming, Brandon, Man.; Mr. F. N. Darke, Regina, Sask.; Mr. Jeff. Davis, Grand Forks; Mr. Guy Lowenberg, Creston, B.C., and Mr. J. D. Anderson, Trail, B. C.

Mr. T. S. Baxter, the Treasurer, is one of Vancouver's progressive business men, and holds one of the aldermanic seats in the city council. The Secretary of the Association is Mr. P. W. Luce, of New Westminster.

Started with a membership of less than fifty, the Canadian Highway Association has attracted nearly one thousand men interested in the improvement of roads, and it is within the realm of probability that the roll will total five thousand before the end of this year. A systematic campaign is to be launched with a view to securing more members, as the officers recognize that in the interest shown in the scheme of the Canadian Highway depends largely the success of the project. Branch associations are being formed in a number of outside cities. These will be associated with the parent organization and will work in harmony with a view to the linking up of the different stretches of road that will go to form the long chain to be known as the Canadian Highway.

Mr. P. W. Luce, New Westminster, B. C., Secretary of the Canadian Highway Association

The interest in the movement is not confined to individuals and enthusiasts. Automobile clubs and Boards of Trade have placed the stamp of approval on the work outlined by the association, and have endorsed resolutions commending the scheme. Boards of Trade, as a body, are entitled to membership in the Canadian Highway Association, a special fee of one dollar for members having been provided for these organizations, instead of two dollars, the individual admittance fee. Automobile clubs and other organizations are also entitled to this preferential clause. The membership fee was placed at the low figure of two dollars for the purpose of securing a large membership.

In some quarters the impression prevails that good roads benefit only automobile owners, but this view is held mainly by people whose business does not call upon them to travel outside the city's paved streets. Teamsters and farmers are just as anxious for good roads as are chauffeurs. Good roads are a public benefit and in no way a class privilege.

The broad spirit that animates the members of the Canadian Highway Association is best described in these few clear-cut phrases, which might be described as the creed of the Canadian Highway Association:

To capitalize our climate and scenery in building roads that will bring tourists here from all parts of the world.

To assist in having a Canadian Highway established from Alberni, B.C., to Halifax, N.S.

To promote good roads.

To endeavor to get the connecting links of this highway constructed as soon as possible by the different governments and municipalities through which the road passes.

To have the Canadian section of the Pacific Highway, which runs from Tia Juana, Mexico, to the Alaskan boundary, completed.

To have public money expended on roads spent to better advantage.

To carry on a campaign of education in order to enlighten the people regarding the benefits to be derived from good roads.

To co-operate with the different governments with a view to bettering the standard of roads for which Federal or Provincial grants are made.

London to Canada by Train

The scheme for tunnelling the Behring Straits and thus linking up the railway systems of Siberia and North America is again being revived, representatives of an American syndicate being at present in Europe for the purpose. The scheme involves the construction of a forty-mile tunnel beneath the Straits, and the building of new railways both in Siberia and Northwest America to reach the approach stations on each side, and would enable passengers from any European capital to travel to New York and the principal cities of the United States and Canada by train journey throughout. It is proposed to sink shafts from islands situated midway in the Behring Straits, thus enabling construction to be begun simultaneously from various points. These shafts would subsequently be employed for ventilating the tunnel.

Reinforced concrete floors have been installed in the shaft stations of the Mohawk and Wolverine mines in the Michigan copper country. According to the "Engineering and Mining Journal" the floors are 6 in. thick and are designed to carry a load of 400 lb. per square foot. The reinforcement used by Mr. W. F. Hartman, the designing engineer, consists of a double layer of 4-in. triangular mesh with ⅜-in. strands of old hoisting cable that have been obtained by unlaying 1⅛-in. cable running crossways to the strands of the triangular mesh and at 6-in. centers. The triangular mesh is protected by 1 in. of concrete at the bottom of the floor slab.

Mr. Henry J. Fuller, president of the Canadian Fairbanks-Morse Company, Montreal, has sailed for England on private business.

Suggested Code of Ethics for Engineers

Professional Relations should be Established upon Principles of Strict Honor—Duty to Clients—Attitude toward Contractors

THE president of the Boston Society of Civil Engineers, Mr. Chas. T. Main, has drawn up a code of ethics for the engineering profession which contains many points of interest. The code has been recommended for adoption by the Boston Society. It embodies the general principles of engineering procedure; the duty of the engineer to his client; his attitude to his competitor, to his assistants, and to his superiors; his position in regard to contractors; and last but not least his relation to the advertising field. The code is as follows:

1. Engineers should encourage sound engineering learning and training in the scientific schools and in actual work.

2. The success of engineers depends upon their moral character, scientific attainments, industry, integrity and business talent. The kind of competition considered honorable in purely business transactions cannot exist among engineers without diminishing their usefulness and lowering the dignity and standing of the profession.

3. The first duty of engineers is to their clients, who have a right to expect that that portion of their business entrusted to the engineer will receive very careful investigation and intelligent treatment and that such information derived by the engineer, which is peculiar to that business, will be considered as confidential.

4. Engineers in their professional relations should be governed by strict rules of honor and courtesy. Their conduct toward each other should be such as to secure mutual confidence and good will.

(a) They should take no step with a view to divert to themselves the clients or work of other engineers.

(b) If for any good reason a client should desire to transfer his work to another engineer, it is his privilege to do so, but the engineer in charge should be given notice, with the reason for the same, of such change by the client, and the engineer to whom it is transferred should, before accepting the work, communicate with the engineer in charge, in order that there may be no bad feeling caused through misunderstanding.

(c) All communications shall be made through the responsible head, unless others are designed to act for the principals.

(d) No attempt should be made to secure the services of assistants of other engineers, without communicating first with the principal in order to see that such action will not embarrass him.

(e) No assistant should contract to go with another engineer without first consulting with his superior.

(f) A superior should not stand in the way of advancement of a subordinate.

(g) The criticism of another's work should be broad and generous. The success of one member brings credit to the whole profession and the failure of one, discredit to the whole.

(h) The attitude of superiors to subordinates should be that of helpfulness and encouragement.

The attitude of subordinates to superiors should be one of constant courtesy.

The treatment of each other should be open and frank.

(i) The engineer should be willing to assume his proper share of public work and render such assistance as is possible for the general good of the community.

5. Consultations should be encouraged in cases of doubt or unusual responsibility. The aim should be to give the client the advantage of collective skill. Discussions should be confidential. Consulting engineers should not say or do anything to impair the confidence in the regular engineer, unless it is apparent that he is wholly incompetent.

6. Schedules of fees have local application only and are designed to show reasonable charges for service in such locations. With the understanding and consent of their clients, engineers may beforehand place any value on their services deemed proper.

7. Engineers should, so far as possible, not be interested in any mercantile enterprises which will prevent them from giving an unprejudiced opinion on appliances to be used in their work.

They should not receive commissions for materials, appliances or labor entering into the work under their supervision.

In advertising they should avoid, as much as possible, any impression of commercialism.

8. The attitude of engineers toward contractors should be one of helpfulness and tactfulness, combined with just and firm criticism.

9. As the lines of distinction between the various branches are becoming less marked, an intimate relation of the various branches should be encouraged.

Professional Ethics Enlarged Upon

In enlarging upon certain of the articles of this code Mr. Main said concerning 4 (b): "If the owner or client desires to make a change, that is his privilege, and there can be no wrong done if another engineer comes in on invitation; but to deliberately attempt to secure work which would naturally go to the other man is beneath the dignity of an engineer."

Concerning 4 (g): "Criticism of another's work should always be done in a kindly spirit, and the good points mentioned in addition to those which are not good. Owners or managers often decide as to whether the engineer's advice and plans shall be carried out, and take the liberty of changing the same. There is oftentimes more than one way to do a piece of work, and each way may give equally good results, and we should, therefore, hesitate before condemning another man's work, especially without a full knowledge of all the conditions. Of course there are sometimes cases where something is radically wrong, and we should then not hesitate to say so, if called upon to report on the same."

The article 4 (h) he commented upon as follows: "The treatment of superiors should be courteous and with little criticism, as it may be impossible for a subordinate to know all of the conditions entering into the solution of a problem, only a portion of which he is acquainted with. A subordinate should always be free to express his opinion to his superior, if he thinks he sees any way to improve the work in hand. He should always endeavor to sustain his superior, unless he is aware of a false position on the part of the superior. As much responsibility should be put upon the subordinate as he can carry. Kindly criticism will accomplish more than abuse, and, as a rule, this will not be abused."

Advertising

Concerning advertising, Mr. Main made the following excellent suggestions: "The solicitation of business should be done with the least possible show of commercialism. An engineer cannot advertise his brain as a storekeeper can his goods. It is, however, well for a man to keep his name in some proper way before the people who are likely to need his services. This can be done in a way which is effective by publishing short descriptions of work, accompanied with pictures and plans of the same, in a manner instructive and interesting. An effective manner to advertise is to prepare papers on subjects connected with one's line of work to be done. There is then a distinct suggestion to the minds of men that the author knows something of what he is writing about."

"The acceptance of 'rebates,' 'commissions' or 'rakeoffs' by the engineer from manufacturers or parties furnishing apparatus, cannot be too strongly condemned," said the author.

Failure of Erindale Power Company's Dam

By Francis F. Longley, Resident Engineer,
Filtration Plant, Toronto

THE power plant of the Erindale Power Company is located on the Credit River, which flows southward through the southern part of Ontario some 15 miles west of Toronto. The works consist, in general, of a dam, the recent failure of which is the occasion of this article; a tunnel some 900 ft. long, extending from the pond above the dam to the power house below; and the power house itself.

The drainage area of the stream above the dam is some 450 square miles. The low water discharge is said to be about 140 sec.-ft. The dam is so located at the lower end of a spreading valley that it forms a pond with an area at high water estimated at about 200 acres. The total head available at the wheels is 65 ft. The power house is equipped with two 50-in. wheels driving generators, and a third wheel case and draft tube for an additional generator if conditions ever warrant its installation. The generators are 600 kw., 13,200-volt, three-phase, 60-cycle, running at 200 r.p.m., and were built and installed by the Allis-Chalmers-Bullock Company, Ltd.

Details of Construction

The dam is of earth with a core of concrete masonry. The latter is 8 in. wide at the top and 5 ft. at the bottom, and is carried down through soft shale and gravel in the river bed to the hard argillaceous sandstone below. The height of the core wall above the river bed at its deepest point is about 35 ft. It is strengthened by buttresses on the down-stream side. There is no systematic scheme of steel reinforcing in it, although light steel rails bent to a zigzag shape were used to bond together successive courses of the work. Stability of the structure was intended to be obtained from the earth embankments, which were placed on both sides of this core wall. It is stated that both the core wall and the embankments were intended to be carried to an elevation several feet higher, and if this had been done it is possible that the dam would not have been damaged by the recent flood. For some reason, however, work was stopped on it, and the plant was put in service in this incomplete condition.

The dam has an overall length of about 700 ft. It has a spillway section of massive concrete in the middle, and sluiceways immediately adjoining. The spillway has a net length of 96 ft. and a depth below the top of the dam of 6 ft. The sluiceways, of which there are three, controlled by sluice gates, have a total area of about 250 sq. ft., and the head on their centre, when the flood was at its height, was about 25 ft.

This dam is quite the largest one on the river. There are none other below it, but the stream flows into Lake Ontario four or five miles down. Above it there were some thirteen other dams, mostly of wooden cribwork, ponding the water on an area estimated at 350 to 400 acres. During the first week of April this stream, in common with many other streams throughout the country, was in flood. The snowfall the past winter has been heavy, but the rainfall this spring has not been exceptionally rapid. However, the flood became severe enough on April 6 to cause one of the small dams in the upper part of the river to give way. By the following morning this had so aggravated the flood conditions that others of the small dams failed completely or in part, letting the water down upon the dam of the Erindale Power Company. This company had anticipated trouble since the day before, and had a volunteer force of about 50 men at work placing sand bags along the top of the dam. The height of the flood came with a rise of 17 in. in a half hour, measured on the pond. This was sufficient to overtop the dam in spite of all efforts. The earth embankment on the downstream side was quickly washed away, and this was followed immediately by a section of the concrete core wall about 130 ft. long and 15 ft. high.

Lack of Spillway Capacity

The cause of the failure was obviously a lack of sufficient spillway capacity to discharge the flood, resulting from the successive failures of the small dams above. It is estimated that just before the failure occurred the discharge of the stream was about 15,000 sec.-ft.

It is estimated that it will cost about $10,000 to rebuild this dam. The accident is a serious handicap to the company, as it cuts down its head by about 12 ft., more or less, and consequently its power output. The principal consumers of this power can easily get power from other sources, which they have to do anyway in time of low water power output, and therefore the failure does not actually cripple them.

It is reported that a number of the old crib-dams on the upper river were completely demolished. Among the others, one concrete dam was damaged only to the extent of having the embankments washed away from the wing walls at the end of the dam. The total financial loss will be serious to the small industries along the river.

Two years ago, while the Erindale dam was under construction, it failed under pressure of a spring flood, and had to be rebuilt. The reasons for that failure, however, were not the same as for the recent one. The procedure followed in the construction was to build one end of the dam complete, together with the massive spillway and sluiceways, leaving the other end down for the passage of the stream. The gap was then to be closed and the dam at that end completed with the stream running through the sluiceways. This procedure involved the risk that a flood might come during the completion of the last portion, which would exceed the capacity of the comparatively small sluiceways, and the unfinished dam be destroyed. That is just what happened.

At the time of the first failure, on March 7, 1910, some of the concrete in the corewall was but a few days old; much of the wall had no embankment against it; the water came up within 5 ft. of the top of this green, unsupported wall with the result that it gave way, and the flood carried out about 100 ft. of the dam, scouring apparently clean to the rock. This earlier failure emphasized the necessity for ample provision during construction for taking care of the heaviest flood flows, which might be expected.—Engineering Record.

Refractory Building Material

By Charles L. Norton

IT is clear that in order to be accepted as a substitute for wood in building construction, a new material must approximate in lightness, strength, elasticity and ease of working, the natural woods, and further, since the variation in natural woods fits them for special details of construction, the substitute must be had in different grades of hardness, toughness, firmness of texture, etc. Moreover the ease of working, sawing, boring, nailing and so on, leads to a wide use of natural wood, and a substitute to be acceptable must approximate the ordinary woods in these respects.

There have been from time to time, in the last 30 years, attempts to make use of boards composed only of refractory, inorganic substances. In general, such boards have been composed of some fibre and a cementing medium. The most popular fibres for this sort of experimentation have been asbestos and mineral wool, the cements used including about all the common cements of both the air drying and the hydraulic types. Oxychloride of magnesium, the value of which as a cement was discovered some fifty years ago by Sorel, has been the favorite cement for experimenters because of its simple preparation, its quick hardening and great strength. For some reason, however, a large percentage of the oxychloride cement is variable in its properties and often defective. When mixed with sand or similar dense bodies the oxychloride is often satisfactory for long periods, but the experience of the author with mixtures of this cement with fibres, both organic and inorganic, leads to the conclusion that it is unstable and unsatisfactory. This is more probably the case when the boards are used in damp places or out of doors.

After much study two conclusions seemed inevitable to the author: First, no homogeneous inorganic substance was likely to prove satisfactory, but that a mixture of a fibre and a cementing substance was necessary to give wood characteristics to the material; and, secondly, a mixture of asbestos fibre with one or two cements (first, oxide of magnesium or calcined magnesia, and, second, calcium silicate and aluminate mixture) seemed more suitable than any other combination.

Asbestos Wood

From these conclusions the author proceeded to develop a material, under certain processes of mixing, pressing and curing, which he calls asbestos wood. He claims that it is practically incombustible, harder than natural woods, has a transverse strength about two-thirds that of white pine with the grain, and, without being brittle, an elasticity less than that of natural woods; the co-efficient of thermal conductivity has been found in English units to be between 50 and 30 per square foot per 24 hours, per 1 degree Fahrenheit.

The weight of the several grades of asbestos wood 1 inch thick varies from 8 to 13 pounds per square foot. White pine 1 inch thick when dry weighs approximately 3 pounds per square foot, and oak about twice as much. The transverse strength of boards and the minimum fibre stress is between the limits of 5,000 and 10,000 pounds. Test specimens 12 inches wide, 12 inches long and ¼ inch thick, broken by centre load when supported on two edges with 11 inch span, broke on an average at 200 pounds with grain and 20 pounds across it. In some cases the equality of strength in both directions is of great advantage.

The tendency of the material to absorb water varies between the limits of 4 per cent. and 20 per cent. This absorption is not of such a nature or amount as to cause disintegration from freezing and the material is not injured by prolonged soaking in fresh water. Sea water tends to disintegrate it after a time, the magnesium salts in the water replacing the calcium of the cement.

The coefficient of expansion varies with the temperature and also with the age of the specimen. It is small, being about 0.000004 at ordinary temperatures, diminishing rapidly at 700 degrees Fahrenheit, and becoming negative at 950 degrees Fahrenheit where shrinkage occurs.

The operations of boring, sawing and finishing are all somewhat more difficult with asbestos wood than with the natural woods. It withstands scraping and rubbing much better. Floors and stair treads made of the material wear well, but are liable to be slippery when wet.

Its ability to stand heat makes it available for blocks on friction brakes where a flexible material is not needed. The coefficient of friction of iron is approximately 0.3 to 0.4.

It has also been used as a mold for glass utensils during the process of manufacture, its non-conducting properties making it preferable to iron in some instances.

Fire-Resisting Qualities

It is, of course, the fire resistance of the asbestos wood which gives it its greatest interest. There is nothing combustible in it, and on exposure to fire nothing can occur except a gradual dehydration of both fibre and cement. Under prolonged red heat the boards become weakened, but for such exposure as occurs in fires in buildings the resistance is ample. For instance, a sheet of ¼-inch asbestos wood may be placed over the top of an open furnace at 1,700 degrees Fahrenheit, the flame impinging directly on the lower surface of the sheet, and at the end of half an hour the sheet may be taken off and while its lower side is still white hot be plunged into cold water and then returned to the furnace for ten minutes. It may be slightly warped and its strength will probably be diminished 25 per cent. or more, but it will still be sound and whole and free from cracks or serious weakness. Fire tests have shown the ability of the material to withstand exposure, but it is not suitable for linings for furnaces or kilns which are kept constantly at red heat. In some fire tests the paint on the outside of an asbestos wood door 1¼ inches thick was not scorched after the fire inside had been burning at a temperature of 1,700 degrees Fahrenheit for more than an hour.

For rough concrete work it is generally best to use lumber for sheathing that is dressed at least on one side and two edges to make the boards of uniform width so that they will fit together. Even if the appearance of the concrete is of no account, the smooth form surface will reduce the labor of removing and cleansing the forms.

The Progress of Wireless Telegraphy

An Interesting and Timely Review by a German Expert—Permanent Connection between England and Canada still holds the Record

IN the light of the part played by wireless telegraphy in the recent disaster to the "Titanic," it may be safely asserted that one of the effects of this great calamity will be a world-wide demand for the attainment of greater perfection in this science. The present age is essentially one of travel and rapid transit, and in spite of the manner in which the public craving for speed has been condemned on all sides, it is hardly likely that this craving will be removed by a disaster even of the proportions of the Titanic, for the reason, primarily, that the world cannot afford to go slowly, and secondarily, that it is not in human nature to give up. The history of all advancement in whatsoever departments of life is punctuated with great disasters and in the present case as in the past it is more than likely that the ultimate effect will be a concentration upon the various sciences a complete mastery of which will practically eliminate the possibility of these accidents.

Doubtless many of our engineering readers will read with some interest the following extract from an article entitled, "The Present Position of Wireless Telegraphy," written by Count von Argo in the Elektricitats Gesellschaft Journal. The portion reproduced is prefaced by a short sketch of the progress made by the wireless telegraph companies in their fourteen years of development. As is well known, Marconi's inventions were exploited by an English company which undertook both the delivery and installation of plants, as well as the erection of wireless stations for the transmission of general news. Owing largely to the favorable geographical and political situation of England, the company has secured equal rights with the Marconi company and is meeting with considerable success in its operations. The number of stations installed is a guide to the importance of the different firms in the markets of the world. In an official list some 1,300 wireless stations, distributed through all parts of the world, are mentioned. The extract from Count von Argo's article follows:

The essential apparatus in every wireless installation is (1) the transmitting apparatus for producing high frequency alternating currents, (2) an antenna for radiating this energy, (3) a second antenna at a distant point for collecting the incoming radiations, and (4) a receiver which makes them perceptible.

The alternating currents may take two different forms: (1) undamped or (2) damped wave-trains. The first are produced either in accordance with Poulsen's method by an arc in an atmosphere of hydrogen, or directly by means of an alternating-current dynamo specially built for this purpose, a so-called high-frequency machine, and the latter are produced by a spark discharge. The arc method has not fulfilled the hopes placed in it and its application in practice has remained very limited.

The continuous oscillations have only one single periodicity, the number of oscillations per second; the intermittent oscillations, on the other hand, have, in addition to the number of oscillations, a periodicity of the groups. As each group is derived from the energy of the one spark discharge, the periodicity of the groups is equal to the rate of sparking per second. A transmitter with intermittent oscillations can, therefore, possess more individuality.

As already mentioned, frequencies up to 1,000,000 periods per second are adopted for high-frequency currents in our technique. Such frequencies cannot be produced either at the present time or at any early period in the future by a high-frequency dynamo. Alternating currents of 50,000 periods have, however, also acquired a certain value in the last few years, particularly for telegraphing over very great distances. Such frequencies can be generated directly on the dynamo principle from mechanical energy, by means of certain special dynamos.*

The high-frequency machine is expected to produce an increased wave energy. Hitherto, however, no failure in wireless telegraphy has been due to the fact that insufficient quantities of energy were available for the transmitter, but because they could not be radiated. The antenna difficulties limit the outputs. When antennae have actually been invented by means of which 500 or 1,000 kw. can be radiated, then perhaps the spark method will fail, and then the machine may assume a greater importance.

High-frequency currents up to more than 100 kw. and frequencies up to millions per second, and down to a few thousands, are produced with spark discharges. The most modern spark method can be well demonstrated by means of a tuning fork which is struck. The energy is imparted to the tuning fork by a short stroke, and this energy is converted into an acoustic wave-train of decreasing amplitude, and radiated. When the tone has entirely or nearly died away a new stroke is given. The hammer strokes correspond to the sparks in the electrical simile. The quantity of energy of a spark is converted into an alternating-current wave train of decreasing amplitude.

In German stations the sequence of the strokes is usually at the rate of 1000 per sec. Let us assume that the alternating current generated has 100,000 periods, and that each wave train ceases after 100 oscillations, then the intervals between the wave trains exactly disappear and the new spark always occurs at the moment when the previous wave train ceases. The spark method has some advantages over the machine. Of these we only mention the absolute constancy of the periodicity which is here dependent upon fixed electrical values, the double characteristic of the transmitter for high and tone frequency, and the variable accumulation of the energy per second for obtaining greater momentary effects at the receiver.

Sounding Blow-out Spark System

The most perfect form of the spark method at the present day is the "sounding blow-out spark" system. Three electrical properties should be mentioned in particular: (1) the intervals between the wave trains are extremely short, (2) the distances between the groups are of equal length and the wave trains follow one another with absolute regularity, whereby a tone is produced in the receiver telephone; (3) the rapidly extinguished spark has the further advantage that it exists only during the very first oscillations, a long aerial wave train continuing after its extinction. The energy loss of the spark is confined to a very small fraction of time, or speaking practically, it is entirely overcome. After a long period of laboratory work, this extinguishing principle, given by Prof. Max Wien, has been developed by the

Telefunken company to a stage of perfect reliability, even in plants working with a wave energy of 100 kw.

The available high-frequency energy is led to the antenna by the transmitter, a part being radiated from it and producing a distant effect. This is the actual work of the antenna. Only very recently has more light been thrown upon the phenomena occurring in the antenna, and the distance effects. Within the last two years Dr. Kiebitz, engineer in the telegraph experimental department, has carried out new experiments with improved earth devices, and has published the results, some of which are very favorable. Among other matters, he states that by means of an antenna erected by five workmen in one morning he was able to hear the signals of a station in Canada at a distance of 3700 miles.

The form of antenna hitherto employed generally consisted of wires with an upper conducting end surface, which were led vertically upward and supported by high masts; the dimensions were dependent upon the distances and the quantities of energy. The greater the distance to be bridged over, the greater must the energy be which is sent into the antenna and radiated from it. The greater the energy is, the larger must the antenna be, both as regards the upper wire surface and the height of the same. The cost of the towers increases almost as the cube of their height. Here, then, lies the practical limit for the transmission range of wireless transmitting stations. It is certainly possible to generate 100 or even more kilowatts in the form of high-frequency alternating current; one cannot, however, build without enormous expense an antenna which will radiate it satisfactorily. If the earth antennae fulfill all the hopes which many experts promise for them, then perhaps a new epoch in the construction of large wireless stations will begin for the longest distances ever known to our world, and then perhaps the high-frequency generator will receive preference over the spark system. One must not be too optimistic, however.

The same antennae are used for receiving as for transmitting. By syntonizing the receivers greater distances can be covered on the one hand, and on the other hand it is possible to receive the signals of other transmitters, or not to hear them, according to the adjustment. How are the weak currents of the receiver antenna made perceptible. The telephone cannot be operated by them, as its diaphragm is much too slow to follow the 100,000 or more periods of the receiving current. The acoustic organ of the human ear is also too slow and would not hear these telephone tones. It is therefore necessary to convert the energy. The high-frequency alternating current is converted to continuous current. This is effected by means of a rectifier, the detector, which at the present day usually consists of a metal point in contact with a special mineral, for example, platinum and lead sulphide.

From a damped high-frequency wave train a continuous current impulse is produced by rectification, and the latter finally moves the membrane of the receiver. A movement of the membrane takes place for every distant spark. At 1000 sparks per second the tone with 1000 vibration periods at the receiver is heard.

Progress in Recent Years

The technical progress of the last few years can best be realized from the extended range of application. The transmission distances of the stations have been relatively increased, as it is now possible to transform 50 to 75 per cent. of the machine energy into antenna energy. Requirements can, therefore, be met with smaller primary plants. Owing to the omission of intervals between the wave trains, more energy can be led to one and the same antenna, and owing to the short duration of the spark, it is possible to transform very large quantities of energy into vibrations without disturbing the spark electrodes. The freedom from disturbances caused by other stations and atmospheric discharges has also been increased to an extraordinary extent.

The construction of all apparatus differs fundamentally according to whether it is required for military purposes or for the transmission of general news. In case of war it is necessary to get one's telegrams through, notwithstanding intentional disturbances caused by the enemy. A large selection and a large tone scale is required, and it must be possible to make all alterations in the electrical adjustment as quickly as possible. Complications and high prices for the apparatus are the natural result.

The apparatus for the mercantile fleet is much simpler and smaller, since as a rule only short distances come into question.

When one hears that with these small stations, which send 1.5 kw. into the antenna, it is possible to bridge over distances of many thousand kilometers, one would think that with an antenna energy of 35 kw. it would be possible to reach fantastic figures. This is not the case, however. These long-distance results on ships are obtained at night. During the day, on the other hand, only distances of 600 to 700 kw. can be covered.

Marconi was the first to recognize the cause. Light is the enemy of electric waves, and a greater enemy and energy disturber, the higher the frequency of the alternating current. It is certainly easy to produce low frequencies but very difficult to radiate them economically. The antenna determines the maximum frequency, by its height. The higher an antenna is, the better it is for low frequency. Thus we are here faced by a great difficulty. If it is desired to make a permanent connection over a long distance, a connection which will work in the strongest sunlight, as for example, at midday in the tropics, then a low frequency is necessary. For this purpose a very high antenna is required. Marconi was also the first to establish a permanent connection over 1900 miles between England and Canada, which is still the only plant of the kind. His two stations are both the same size, and are both provided with enormous antennae.

The Distribution of Stresses in Certain Tension Members

A paper on the above subject was given by Mr. C. Batho, A.M.Can.Soc.C.E., at a meeting of the Canadian Society of Civil Engineers, held in Montreal, on April 25.

It is becoming generally recognized among engineers, said Mr. Batho, that a correct knowledge of the strength of structural members cannot be obtained by breaking tests alone. This is more especially the case with built up members in which it is probable that, as soon as some part reaches the elastic limit, the distribution of the load may change, so that the breaking load and the appearance of the specimen at fracture may not give any true guide to the action of the parts under working loads. The most satisfactory way of obtaining a knowledge of the latter is by measuring the actual strain distribution under working loads, or, at any rate, at loads within the elastic limit of the parts, by means of some form of extensometer. Mr. Batho then described at length experiments made at McGill University to determine, by means of strain measurements with a modified form of the Martens Extensometer, the distribution of stress in single and double angles with riveted and end-plates loaded in tension, and to compare it with the theoretical distribution under different assumptions. Experiments are still in progress on similar members in compression and on built up members, and it is hoped that the present paper may be only a first contribution on the subject.

The experiments on built up members indicate that these do not, in general, act as one solid piece, but that the separate parts must be considered as eccentrically loaded members subject to constraints. From this it appears that the only way to build up a satisfactory theory of the action of such members is to commence with the problem, which is important in itself, of a uniform piece subjected to an eccentric load, and to work up gradually to more complicated members.

In his remarks on built-up members, Mr. Batho stated: A built up tension or compression member is one which is made of two or more simple sections, such as angles or channels, fastened together by rivets and by tie plates, lattice bars, or other connections, as in the case of a large column. Probably the simplest form is the double angle considered above. Such a built up member is usually considered as acting like one piece, and the forces in the tie plate or lattice connections are found on the assumption that, if any bending takes place, the whole member bends like a beam. The experiments show that this is not true for the specimens tested, and it would probably be more correct to consider such a member as an assemblage of simple members each trying to bend about its own neutral axis, but more or less constrained by the subsidiary latticing, etc. The only way to arrive at a correct theory of the action of such structures is to consider the simplest cases first and to approach gradually the more complex by introducing one constraint after the other, and finding their effect by experiment and analysis. An example will make this point clear. Consider a column in the form of a rectangle, built up of four angles, connected by tie-plates or lattice bars, and loaded through two loading plates riveted to the angles at the ends. The ordinary theory would assume that the whole member behaves like one piece, the tie-plates or lattice bars simply taking up the stress like the web of a girder. According to the theory advanced the four angles would be regarded as trying to bend about their own neutral axes in the way a single angle has been shown to behave above, and the tie-plates would constrain them against twisting, and so would themselves be under bending stresses, the whole action being, of course, somewhat complicated. It may be stated that actual extensometer experiments on such a column, carried out under the direction of Professor H. M. Mackay, at McGill University, entirely bear out this view, the stresses in the tie-plates being found to be tensile on one side and compressive on the other.

Conclusions Reached

The chief conclusions to which the [illegible] are:

(1) That the form of extensometer described is very accurate and simple in operation, and that it is possible by its means to obtain very closely the distribution of stress in a piece of material under load;

(2) That experiments made with these extensometers on tension specimens of uniform cross-section subjected to eccentric axial loads not in an axis of symmetry of the cross-section, bear out very closely the general theory for such a case;

(3) That the point of application of the load for a single angle member loaded through a plate riveted to one of its legs may be taken as in the line of rivets and at the common face of the plate and angle;

(4) That the end plate, under ordinary conditions, offers no appreciable restraint to the bending of such a member;

(5) That a member consisting of two angles riveted together through a connecting plate does not act as one piece, but that each angle bends about its own neutral axis, and that it is not always an advantage to attempt to make it act as one piece by further constraints;

(6) That a built up member should not be regarded as a single piece bending as a beam, but as several pieces each trying to bend about its own neutral axis, but restrained from doing so by the subsidiary members, such as the tie-plates, or latticing.

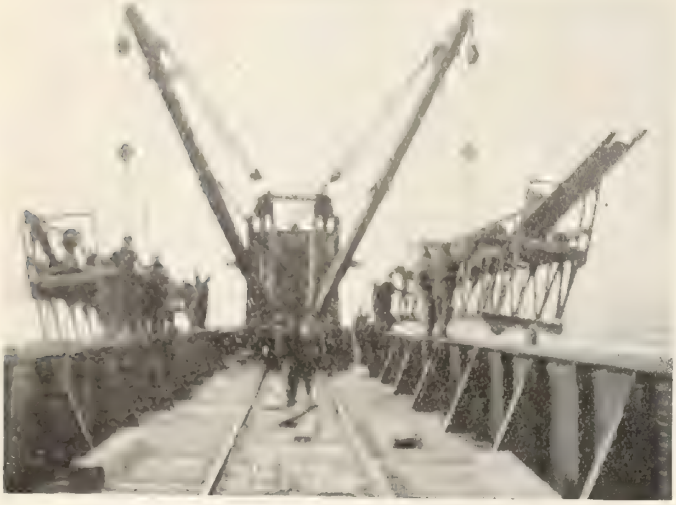
Mr. Batho expressed his thanks to Professor H. M. Mackay (at whose suggestion the work was commenced), Professor E. Brown, and Mr. F. P. Shearwood, of the Dominion Bridge Co., for their personal interest and advice; and Mr. S. D. Macnab, of the McGill University Testing Laboratory, who was associated with him throughout in the experimental parts of the work. He is indebted to the Dominion Bridge Co. for the specimens used in the tests.

Little Salmon River Viaduct

THE Little Salmon River Viaduct, National Transcontinental Railway, was the subject of a paper by Mr. R. F. Uniacke, M. Can. Soc. C. E., at the meeting of the Canadian Society of Civil Engineers, Montreal, on April 11th. Mr. J. M. Shanly presided over a large attendance, including many railroad and bridge engineers. The valley of the Little Salmon River is 185 miles from Moncton, N.B., and Mr. Uniacke stated that in the building of the line it presented one of the obstacles to be overcome [illegible] ment showed a crossing of over 4000 ft. long, with a height of 200 ft. above the water line. The layout consists of twenty-four towers 58 ft. 9 in. centers and twenty-five intermediate spans of 100 ft. 3 in. c. to c., the end spans being 100 ft. 10½ in. center of bent to outer end of steel; all the tower spans are alike and also the intermediate spans, except that the masonry ends are extended to give the required bearing. The towers and bracing are made alike as much as possible necessitating one set of templates only for the spans and [illegible] for towers, which [illegible]. A through

100 ft. girder ready to place; erection struts in position

girder system of construction was adopted, the girders being spaced 17 ft. 6 in. c. to c., while the floor beams with gussets were spaced 14 ft. c. to c., along the plate girders. The east end span is on a spiral to a 6 degree curve and in consequence the girders are deflected at this abutment 1 ft. 3 in. off the tangent to the structure produced. The approach at the east end being through a rock cutting, in order to avoid building the steel work on a curve, and also to utilize the material in the cutting without waste, an abutment of reinforced concrete placed on top of the rock fill was decided on. A buried pier built from the original surface at this point would have been over 100 ft. high, difficult to design and build, and very costly. This was avoided by the use of a bank abutment. The concrete was reinforced to prevent danger of cracks from settlement in the bank, and in order to give time for the bank to settle, the ends of the girders were temporarily supported by a crib-work of square timber, before building the permanent abutment.



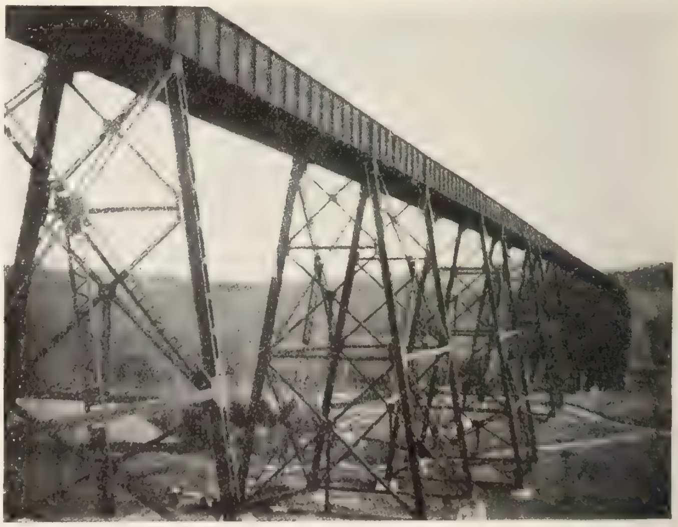
Method of raising and moving rivetting galleries

In the design of the pedestals and west abutment, borings and test pits were first made to determine the character of the soil. This proved to be of compact sand, gravel and hard pan, so that no piling was required, the footings being designed to distribute the load at a pressure of from 2.5 to 4 tons per square foot. The four pedestals near the water line at the banks of the river were built with curved cutwaters, the axis of piers being parallel to the direction of the current, forming suitable icebreakers. The anchor bolts for pedestals consisted of two rods, two inches is diameter, the lengths varying according to the up-lift to be resisted. These rods were anchored at the bottom by spacers of 10-in. channels and washers, the concrete being built around them. In order to give room for a little variation in their position, conical forms were set around each bolt, a lip being left at the top extending beyond the base plate of column through which these voids were filled with grout after the steel was erected. The west abutment or buried pier was about 40 ft. in height above the footing course, and in order to reduce the pressure on the soil and allow the embankment to run through and surround it, an arched void was left in a longitudinal direction. No difficulty was experienced in building to this design.

The rails were directly supported by 8 in. x 12 in. x 14 ft. bridge ties resting on the steel stringers, every fourth tie being 16 ft. long to support the plank footway placed outside the guard timber for the convenience and safety of the section men. An outside guard timber 8 in. x 9 in. dapped 1 in. over the ties, which were spaced four inches apart in the clear, the ties were secured to the stringers by ¾-in. hook bolts, and the guard timbers bolted through the tie with one ¾-in. bolt in every fourth tie. A steel guard rail 60 lbs. to the yard will be placed inside the gauge line, and eight inches therefrom in the clear, these guard rails coming together at the center of the track one rail length beyond the end of the bridge and being protected by a cast steel point fitting the rail section and spiked to the road-bed ties.

Actual erection began July 27, 1910; the steel was all assembled and last span swung February 8, 1911, and all riveting and painting fully completed by August 19, 1911. Material was unloaded at a siding at the west end and handled by a two boom derrick car in the storing yard. A light locomotive standard gauge with lorry cars handled the material from the storage yard to end of steel. The main feature of the erection outfit was the 30 ton two boom erection derrick, travelling on the top flanges of the girders, the trucks of the traveller running on 115 lb. crane rail, the base of which rested on timber temporarily secured to the girder flanges. This derrick was self-propelling by means of a chain and sprocket connecting the trucks with the erecting engine, which consisted of two 10 in. x 12 in. cylinders—two drum—4 spool hoist. The 115 ft. 0 in. booms were box section composed of 4—36 in. x ¼ in. web plates at center section and tapering at the end, connected with four—3½ x 3½ x ⅜ angles. This section was found to weigh actually less than a latticed section and the combined unit stresses from compression and bending were very much reduced. The wind at the deck of the trestle was very strong, and was generally blowing at right angles to the bridge, but the work was practically never held up on account of too much wind. After a tower and its girders were assembled the erection struts were removed and used again to stiffen the first bent of the next tower until it too was connected and self sustaining. The hook bolts temporarily connecting the ends of three struts with the columns proved very efficient.

Another important feature was the use of riveting bridges for convenience and safety of the men in assembling, riveting, and painting. They were carried along the top of the trestle by the two boom yard derrick car, and after being secured to the top flanges of girders by hooks, the cages were lowered or raised by hand, as required, the free end of the tackles being on the platform, so that the riveters could slack away themselves.



General view of the structure

Mr. Uniacke also stated that the steel used totalled 13,991,310 lbs. and the timber 518,041 ft. B.M., while 15131 cubic yards of excavation was done, the total cost being $678,623.

The work was carried out under the general direction of Mr. Uniacke, Mr. W. A. Duff, Assistant Bridge Engineer, having charge of the general design and details. The Dominion Bridge Co., Limited, Montreal, were the contractors for the steel, which was efficiently carried out, Mr. F. P. Shearwood, C.E., having charge of the design for the bridge company. The design and layout for the erection and the traveller were made under the direction of Mr. James Finley, superintendent of erection, who was responsible for the successful carrying out of the erection. The mill, shop, and erection inspection was satisfactorily carried out by the Canadian Inspection Company, Limited, Montreal. The sub-structure was completed by Messrs. Powers & Brewer, sub-contractors under Williard Kitchen Co. The construction and laying out of this part of the work was performed under the direction of Mr. C. O. Foss, District Engineer.

A discussion followed, in the course of which many points in the building of long and high railway viaducts were brought out, Mr. H. H. Vaughan stating that Canada was building not only the longest railways but the longest viaducts in the world.

Building Conditions in Montreal

(Staff Article)

FROM present appearances, from the contractors' point of view, 1912 should be the busiest year ever known. In all parts of the city important enterprises are either under way or are being contemplated, and architects are working overtime preparing plans. Much old property has been purchased at high prices, and this is being torn down and new offices are being erected. One of the things to be noted is the number of these buildings that are being put up in order to provide for the ever-increasing demand for this class of accommodation. Then, too, there are some ambitious projects having for their object the formation of boulevards and the erection of large apartment houses. Some of the new structures are in the hands of syndicates, most of them costing in the neighborhood of $250,000. One, the Lewis Building, is estimated to run into a million dollars, and two, the McGill street building and the Sun Life offices, will involve $300,000 each.

Many factories are being either constructed or plans prepared. The Frontenac Brewery building will entail an expenditure of $500,000, a loft building of the Industrial Securities Corporation, $300,000, while the Vineberg building has cost $200,000. The school programme is a very full one, and includes a Normal School to cost $200,000, and a school at Maisonneuve $140,000, and $290,000 will be spent on two large Protestant schools. Sixteen churches are being constructed or are contemplated, the highest expenditure, $200,000, being on the Parish Church, St. Viateur, which will seat 1,800 people, and the Parish Church, Gilford street, where 2,000 people will be accommodated and $182,000 spent.

There is much activity in theatre construction, as a dozen structures, including moving-picture halls, are being built and planned for. One on Bleury street is stated to cost $300,000, three for the Kinemacolor Company the same sum, and two others are estimated to cost $100,000 each, so that Montreal will be well provided for in this respect. Several new banks are being put up, but as a rule the buildings will not be of first rate importance; a number of club houses, too, are being planned, among them being the addition to the Engineers' Club and the proposed new home of the Canadian Society of Civil Engineers. More apartment houses are being erected, one, the Connaught Apartments, is estimated at $250,000; another, on Bishop street, at $200,000, and most of the others are in the region of $70,000. Besides these, many private houses of a substantial character are to be erected at from $20,000 to $50,000 each.

The government have a long list of post offices for which plans are being prepared, the total expenditure on which will be about $750,000. The city are erecting five police and fire stations.

In the miscellaneous list, the outstanding feature is the C. N. R. tunnel and terminals, which will be started shortly. The estimate for the work is about $5,000,000, but no doubt this will be exceeded. Next in importance are the filtration plant of the city and the widening of the aqueduct, work on which is proceeding and which will ultimately cost a million dollars each. The city have several other schemes on hand, including the enlargement of the Wellington street subway, Champ de Mars improvements, new and improved markets, and an addition to the city hall. Plans are being prepared for the remodelling of the Notre Dame Hospital, which will cost $500,000.

The prediction is made that there will be the usual shortage of skilled labor in Montreal this season. In regard to wages no serious disturbance is anticipated. It is expected that after the expiration of the present agreement between the bricklayers and stone masons' union and the Builders' Exchange, on July 1, the masons will be given an advance of five cents an hour, while the bricklayers will have 55 cents an hour, with a special rate of 65 cents for sewer and concrete work. Some slight revision will probably be made in the carpentry trade. Apart from these trades the following is the fair wage schedule adopted by the Board of Control for Montreal: Structural iron workers, 35c; ornamental iron setters, 30c; plasterers, 45c; lathers, 45c; hoisting engine, 25c; tile setters, 45c; plumbers and steam-fitters, 37½c; plumbers' helpers, 15c; carters, 45c; marble cutters and setters, 40c; painters, 30c; sheet metal workers, 35c; roofers, 35c; electric wiremen, 27½c; cement finishers, 45c; builders' laborers, 22½c; ordinary laborers, 20c; carters (single), $3.15 per day; carters (double), $5.50 per day.

On April 26th Judge Beaudin, sitting in Montreal, decided the case of the Hill Electric Switch Company versus the Ecole Technique de Montreal. It was a claim for $1,864, balance alleged to be due on the contract price of some electric installation work. For the plaintiffs it was said that the specifications conflicted with the rules of the Canadian Fire Underwriters' Association, and that they notified Mr. Archibald, the architect, and the defendants, but that no notice was taken; the architect, however, later gave a verbal permission to go on with the extra work involved. Mr. Archibald denied this, and said that the alleged discrepancies had been discovered by plaintiffs after the expiration of the time when the whole work was to be completed. The judge, in dismissing the claim, pointed out that a contractor should carefully examine all plans and specifications connected with works on which he is tendering and that if he finds therein certain disposition contrary to the rules of the Underwriters' Association, he should make this known before accepting the contract. Otherwise, he will be unable to make an overcharge for extra work which he claims to have done in carrying out the work in accordance with what he considered to be the spirit of the Underwriters' regulations.

Mr. R. L. Werry, Montreal, has been appointed secretary-treasurer of the Montreal Builders' Exchange, in succession to Mr. J. H. Lauer.

Bituminous Materials in Road Work

Extent of Use in the U. S.—Progress in Construction of Bituminous Surfaces — Penetration Methods Employed*

By Arthur H. Blanchard, M. Am. Soc. C. E.†

IN December, 1910, the writer presented before the American Association for the Advancement of Science a paper, entitled "The Present Status of the Use of Bituminous Materials in the Construction and Maintenance of Roads in the United States," which treated of the status of the art and science of this branch of highway engineering during 1908, 1909 and 1910. The development during 1911 of the use of bituminous materials is worthy of consideration. This resume will not be confined to county and state road construction but will also include a consideration of municipal work.

The review will be presented under the following headings: first, a general statement covering the magnitude of the work accomplished by some of the prominent State Highways Departments; second, progress in the construction of bituminous surfaces and the use of palliatives; third, the construction of bituminous pavements by penetration methods; fourth, the present status of bituminous concrete pavements in the United States; fifth, the development of sheet asphalt pavements in municipalities.

Bituminous Materials Defined

As considerable confusion arises because of misunderstanding the various expressions and terms used in describing materials and methods of construction, certain definitions are given in order that the content of the description as set forth below may be manifest to all. The nomenclature used in this paper covering bituminous materials and their use in the construction of roads and pavements follows:

Asphalts are solid or semi-solid native bitumens, solid or semi-solid bitumens obtained by refining petroleums, or solid or semi-solid compounds which are combinations of the bitumens mentioned with petroleums, or derivatives thereof, consisting of a mixture of hydro-carbons of complex structure, larger cyclic and bridge compounds, melting upon the application of heat.

Asphaltic petroleums are petroleums which yield asphalts upon reduction.

Asphalt cement consists of an asphalt, pure or mixed with foreign matter, which may or may not be fluxed with petroleum residums.

Bitumens are mixtures of native or pyrogenous hydrocarbons and their non-metallic derivatives, which may be gases, liquids, viscous liquids, or solids and which are soluble in carbon disulphide. This definition was proposed by Committee D-4 of the American Society for Testing Materials.

Bituminous concrete pavements are those having a wearing surface composed of stone, gravel, sand, shell or slag or combinations thereof and bituminous materials incorporated together by mixing methods.

Bituminous gravel pavements are those composed of gravel and bituminous materials incorporated together by penetration methods.

Bituminous macadam pavements are those consisting of broken stone and bituminous materials incorporated together by penetration methods.

Bituminous surfaces consist of superficial coats of bituminous materials with or without the addition of stone or slag chips, gravel, sand or materials of a similar character. This definition was proposed in the 1912 Report of the Special Committee on "Use of Bituminous Materials in Road Construction" of the American Society of Civil Engineers.

Sheet asphalt pavements are those having a wearing surface composed of a pre-determined graded sand, fine material and asphalt cement incorporated together by mixing methods. Although this definition embodies the ideas of the leading authorities and covers common usage, it has been inserted because it has been claimed that a bituminous concrete containing as part of its mineral aggregate broken stone passing a half-inch sieve and retained on a quarter-inch sieve should be classified under sheet asphalt pavements. Fortunately this assertion has not been received with favor by municipal engineers.

In order to give some idea of the extent of the use of bituminous materials in the construction of roads and pavements in the United States, the superficial yardage of roads maintained by surface treatments, of bituminous pavements built under the jurisdiction of the State Highway Departments of Maine, New Hampshire, Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania and Maryland during 1911 is given. In the following table the yardage for 1908, 1909 and 1910 is included for comparison.

	Tars and Tar-Asphalt Compounds	Medium and Heavy Asphaltic Oils and Asphalt Cements	Light Asphaltic Oils
Surface Treatment of Roads			
1908	57,700	239,500	....
1909	95,500	910,600	4,123,900
1910	123,400	2,434,200	9,890,400
1911	433,700	7,980,400	3,765,200
Bituminous Pavements Constructed by Penetration Methods			
1908	37,800	25,200	....
1909	170,200	2,077,400	....
1910	339,300	4,840,200	26,500
1911	121,900	8,680,900	....
Bituminous Concrete Pavements			
1908	52,100	4,400	....
1909	136,000	219,500	....
1910	158,000	432,600	....
1911	24,400	508,100	....

As under the Rhode Island State Board of Public Roads no construction work was accomplished during 1911, due to the fact that no road appropriation was made by the Legislature, the yardage of bituminous concrete pavements constructed with tar and tar-asphalt compounds in 1911 shows a decrease in comparison with the yardage recorded for 1908, 1909 and 1910, the bulk of which was built by the Rhode Island Board. It is of interest to note, however, that 750,000 gallons of refined tar have been ordered to be used in the construction of bituminous concrete pavements in Rhode Island during 1912. That more permanent forms of construction are favored by our State Commissions is clearly shown by the marked decrease in the use of light oils for surface treatment of roads and the decided increase in the surface treatment of roads with heavy asphaltic oils and asphalt cements. As showing the general increase in the use of bituminous material in the construction of bituminous surfaces and bituminous pavements from 1908 to 1911, the total figures for the four years are given. The total number of square yards for each of the above years is given in the following table:

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*Presented at the Washington Meeting of Section D of the American Association for the Advancement of Science.

†Professor of Highway Engineering, Columbia University, New York City.

1908	416,700
1909	7,735,100
1910	18,244,600
1911	21,514,600

These totals include the yardage of road surface treated with light asphaltic oils. A comparison of more value and representing material progress along the lines of improved methods of construction and maintenance should be based on totals from which the yardage of road surface treated with light asphaltic oils is omitted. On this basis the total yardage is as follows:

1908	416,700
1909	3,609,200
1910	8,327,700
1911	17,749,400

As noted above one line of development in the surface treatment of roads has been the departure from the use of palliatives and a marked increase in the use of bituminous surfaces. This tendency is due in part to the unsatisfactory results which have accrued from using bituminous materials which did not "set up" in from twenty-four to forty-eight hours, to the necessity for repeated closing of thoroughfares and to the recognition on the part of many that bituminous surfaces are more economical and efficacious in the long run than treatments with palliatives. This change is not only characteristic of state work but is even more characteristic of municipal work where the tracking of bituminous materials results on the whole in more material damage to property. The second marked development under bituminous surfaces is in the increased use of various types of pressure and gravity distributors which have been specially designed for this work. The consequent abandonment of the use of pouring cans and ordinary watering carts for this work is to be commended. Many types of these machines have been used during the past year for this kind of work. It has been unfortunate that sufficient information has not been at hand covering the use of these various machines so that an engineer might know the limitations of a machine before purchasing. It is self-evident that, given the kind of bituminous material, the temperature of the material, the rate at which the distributor travels, the callibration of the distributor should be such that the operator will know how much it will distribute per square yard. Information of this character will without doubt be forthcoming with reference to many of the distributors to be used during the season of 1912. Extravagant claims have been made by the designers and manufacturers of distributors. In a certain instance it has been claimed that materials, ranging in character from light oil to an asphalt cement of a consistency suitable for use in the construction of sheet asphalt pavements, could all be distributed by a given machine in amounts per square yard varying from one-eighth of a gallon to two gallons. Recently the writer's attention was called to the fact that a certain designer was recommending the use of a pressure distributor, which necessitated the use of a steam roller in its operation, for the distribution, as a surface application, of a palliative which is always applied cold.

During 1911 bituminous surfaces have not only been used extensively on macadam and gravel roads but they have also been used to a considerable degree on cement-concrete pavements. The improvement of the concrete pavement by the addition of the bituminous surface is marked, as, if the proper kind of bituminous material is used, the pavement is non-productive of dust, is not slippery, and is less noisy than the ordinary concrete pavement. There is no apparent reason why the results accruing from the use of bituminous surfaces on brick pavements would not be equally good. Especially would such be the case where bituminous fillers are used, thus combining many of the advantages of bituminous fillers and bituminous surfaces with the inherent good qualities of brick pavements.

Penetration Methods

In the field of the construction of bituminous pavements by penetration methods the numerous methods which have been employed during 1911 will be described. All these methods have as the principal desiderata the keeping of the bituminous material within two inches of the road surface and the securing of the uniform incorporation of the bituminous material and the broken stone. Due to the lack of uniformity in the density of the surface and in the amount of bituminous material applied by the many methods employed, it is obvious that the uniform incorporation of the road metal and the bituminous cement is difficult to obtain. The average pavement has been generally built in two courses, the foundation course being about four inches thick after rolling and the top course about two inches thick after rolling. Following are brief descriptions of the various methods to which reference has been made. In all the methods the construction is completed by the application of a thin coat of sand, stone chips or screenings.

Type A.—For the upper course broken stone is used containing sufficient small sized particles to materially reduce the voids, as for instance crusher run stone which passes a one and a half inch screen and is supposed to be retained on a half inch screen. In this method, after the upper course is laid, the bituminous material is applied either before or after the surface is rolled, some favoring the former, because of the greater depth of penetration secured. When the upper course is rolled after the application of the bituminous material, a coat of mineral matter has usually been spread over the surface before rolling. The necessity for a second application or seal coat of bituminous material is determined by traffic conditions in many cases, although standard practice in some departments is responsible for the use of one or the other method, independent of the traffic.

Type B.—In case the metal of the upper course is a uniform product of about one inch or one and a half inches in size, the bituminous material is applied after the course has been lightly rolled. Stone chips are then spread upon the surface and thoroughly rolled. After the surface is broomed, another coat of bituminous material is applied. The above method is also used when the road metal varies from one and one-half to two and one-half inches, in which case three-fourths inch stone is usually employed in place of chips.

Type C.—The foundation courses are filled to a certain extent with sand or small sized broken stone and after the course is rolled, excess mineral matter is swept off. After the upper course of road metal is applied, its voids are filled to within about one inch of the surface and the bituminous material applied. The road is finished with a coat of sand or chips which is rolled, although in some cases a second application of bituminous material and chips is used.

Type D.—A closely packed foundation or a concrete base is used and large and uniform sized stone employed for the wearing course. In this method a layer of sand, three-fourths of an inch thick, is placed on the bottom course and bituminous material distributed using about one gallon per square yard. The upper course of metalling is applied and the upper course thoroughly rolled, the bituminous mastic tending to fill the voids of the upper course. Another coat of bituminous material is applied and the surface finished by the application of a coat of chips or two applications of bituminous material are made using likewise two coats of sand or chips.

Type E.—The upper course is constructed in the usual manner and in place of sand or stone chips, a bituminous mastic is applied to the surface, being rolled into the voids and forming the finished surface of the road.

The remarks pertaining to distributing machines mentioned in connection with the discussion on bituminous surfaces apply with equal force to types of distributors used in the construction of bituminous pavements by penetration methods.

The construction of bituminous concrete pavements in connection with which broken stone is used in the aggregate has been developed along certain lines during 1911 although fear of litigation has restrained many engineers from advocating the use of this type of pavement. Considering the diversity of the judicial opinions which have been rendered relative to patents descriptive of various types of pavements and the extravagant claims made by some patentees, it is not surprising that some engineers and public officials believe that the following quotation applies to the use of bituminous concrete pavements, "Unto everyone which hath shall be given; and from him that hath not, even that he hath shall be taken away from him."

However, in contemplating the work which has been accomplished by the use of bituminous materials in this class of construction during 1911, it is evident that even the laity has appreciated the marked tendency to have faith that the courts of the United States, if necessity arises, will recognize that prior art and printed descriptions cover many satisfactory combinations of aggregate which, when embodied in pavements, have inherent stability.

Instances of development in this field of construction will be cited in connection with each of the types of bituminous concrete pavements to be considered later. Although it is not intended to draw up a brief, nevertheless it may be of interest to include in this resume reference to certain specific cases of the early use of each type of aggregate. In connection with this phase of the art and science of using bituminous materials it is well to have in mind that portion of our patent laws which reads thus: "Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, not known or used by others in this country, before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law, and other due proceeding had, obtain a patent therefor." It is the opinion of expert patent lawyers that the construction of a pavement according to any description published two years prior to the date of application of the patent, which may be under consideration, could not be prevented regardless of the validity of that patent. It may be that the disclosure of the process may invalidate the patent, as it is entirely possible that in the issuing of the patent some evidence of prior art might easily have been overlooked. It might be well if the old saying "To err is human" was always in mind when considering the validity of patents.

Classification

Bituminous concrete pavements, in the aggregates of which broken stone forms an integral part, may be divided into three groups, as follows, the classification being based upon the character of the mineral aggregate:

Type A.—One size crusher run stone, that is, any one product of a crushing plant.

Type B.—Combinations of one size crusher run stone and fine mineral matter, such as sand, stone screenings and fine gravel.

Type C.—Finely graded aggregates of broken stone and sand or other mineral matter.

Naturally Type A has been very popular due to its inherent simplicity. During the year past the writer has seen excellent pavements constructed by this method where the aggregate was a one size crusher run stone having the following characteristics based upon a mechanical analysis: all the stone passed a one and a quarter inch sieve; not over twenty-five per cent. passed a one and a quarter inch sieve and was retained on a three-quarter inch sieve; and not over five per cent. passed on a one-eighth inch sieve. Descriptions of old pavements of this type are legion. As an illustration may be cited the following specification used in England prior to 1899. "The hot stone, when ready for mixing, is screened into material of three sizes, 1 to 2 inches for the body, ½ to 1 inch for the intermediate coat, and ¼ to ½ inch for the top dressing. The coarsest material is used in a layer 3 to 4 inches thick, the intermediate size forms a coat of about three-fourths of an inch, and the top dressing is used in thinnest layer possible, with a view to filling all interstices. Afterward a dressing of quarter inch and smaller granite screenings is scattered broadcast, and the traffic at once allowed on the road to work this top dressing into the tarred material. Each of the layers is rolled separately with a ten-ton roller."

The State Board of Public Roads of Rhode Island has used Type A since 1906. It has been admitted in writing by certain patentees "that so long as the construction is of the nearly uniform sizes of stone which you are now using, and you do not get the fine material applied from the surface or into the spaces between the particles of bitumen-coated stone more than our observations indicate you are now doing, or we believe it is possible to do, we would not claim this feature of the construction to be an infringement of our patent No. 727,505." The construction referred to in the above quotation covers the construction of a wearing course of a bituminous concrete pavement under the following specifications relative to the broken stone. "The bottom course shall consist of stone from one and one-quarter (1¼) inches to two and one-half (2½) inches in their longest dimension, the upper course of stone from one-half (½) to one and one-quarter (1¼) inches in their longest dimensions." Only the upper course stone was mixed with bituminous material. The product of the crusher which met this specification was obtained from the ordinary type of crushing plant, and broken stone usually passing a one and one-half inch screen and commercially being retained upon a three-fourths or five-eighths inch screen. A mechanical analysis of a typical product used in Rhode Island may be of interest and hence is given below:

Per cent. passing 10 mesh sieve	1.0
Per cent. passing ¼ inch sieve	2.5
Per cent. passing ½ inch sieve	30.5
Percent. passing ¾ inch sieve	34.2
Per cent. passing 1 inch sieve	23.4
Per cent. passing 1¼ inch sieve	8.1

As Deputy Engineer for the State Board of Public Roads of Rhode Island, the writer had charge of the construction and maintenance of bituminous surfaces and bituminous pavements for a number of years and hence had the opportunity to inspect on numerous occasions the first section of bituminous concrete pavement constructed in 1906 under the above specification. This section has needed no repairs although subjected to high speed motor car traffic of the heavy passenger type. Without doubt broad minded judges would admit that this type of pavement has inherent stability.

The second type, that is, one having an aggregate composed of one size crusher run stone mixed with fine material such as sand, screenings or material of a similar character, is likewise described many times in early technical literature. For example, the following description was published over thirty years ago: "The manner of preparing, treating, and laying the asphalt mass is as follows: He took asphalt, one hundred and twenty-five parts; petroleum-oil, twenty-five parts. These substances were melted and thoroughly incorporated together, and to this mixture he added, in a heated state, sand or powdered stone, seven hundred and fifty parts, and gravel or broken stone, also heated, eleven hundred parts. The whole was then thoroughly mixed."

During 1911 Type B was popular in various quarters. In Washington, D. C., under the jurisdiction of Captain Mark Brooke of the Office of the Engineer-Commissioner, bituminous concrete pavements were constructed under the following specifications covering mineral aggregate: "The paving materials shall be composed of crushed trap rock screenings, concrete sand and mineral dust in the following proportions: Trap rock screenings, two parts; concrete sand, one part, and mineral dust, at least five per cent. of the above aggregate; mixed with asphaltic cement." The trap rock screenings referred to above varied in size from one inch to screenings and were devoid of dust. Detailed specifications were also given with reference to the character of the sand and the mineral dust. The writer has had the good fortune to examine various streets paved under the above specifications. In his humble opinion these pavements possess inherent stability under commercial traffic.

In connection with the discussion of the use of the third type, that is, a graded aggregate of broken stone with or without sand and fine mineral matter, the consideration of the following description, so old as to be covered with the dust of decades, is apparently pertinent. "Broken stones are preferred for the whole pavement, and shall alone be used for the covering. The greatest dimension of stones for the base, (except as hereinafter noted) shall be between three inches and one-fourth inch, and for the covering, between two inches and one-twentieth of an inch; the sizes shall be mixed in proportion, varying with the size to form a close mass, which, when dry and compact, can absorb not more than twenty per cent. of water."

During 1911 many thousands of yards of a pavement of Type C have been laid. In the Borough of Richmond, New York City, over 40,000 square yards were laid on a total of eighteen streets last year under direction of Theodor S. Oxholm, M. Am. Soc. C. E. The mineral aggregate used conformed to the now famous Topeka specifications. A decree was signed by certain officials and representatives of certain patentees covering the use of the Topeka mineral aggregate. The following quotation is from the decree to which reference has been made: "it appearing to the court that of the mineral matter used in the pavements actually constructed in the cities of Topeka and Emporia, Kansas, no particles of stone were used that would not pass a screen with openings one-half inch in diameter, and that less than ten per cent. of the stone or coarse sand used would be retained upon a screen with openings one-quarter inch in diameter, and the remaining mineral matter used being finer than one-quarter inch; and it further appearing that pavements constructed by the use of mineral particles as above described do not infringe the claims of complainant's patent No. 727,505, sued upon in this case;" "And it further appearing that the pavements as actually constructed in the cities of Topeka and Emporia, Kansas, do not infringe the claims of complainant's patent No. 727,505, sued upon in this case, and that any pavements hereafter constructed in substantial compliance with the following formula, to wit:

Bitumen... ... ... from 7 to 11 %
Mineral Aggregate, passing 200-mesh screen 5 to 11 %
40-mesh screen from 18 to 30 %
10-mesh screen from 25 to 55 %
4-mesh screen from 8 to 22 %
2-mesh screen less than 10 %

Sieves to be used in the order named would not infringe the claims of said patent."

Mention should be made of the effect of the introduction of various types of low priced mixing machines during 1911. The economical and satisfactory results accruing from the use of these machines for mixing certain types of aggregates with bituminous cements has caused the introduction of the mixing method in many localities where only the penetration method has formerly been used. During the season of 1912 many new machines of this type will be used with the consequent increase in the construction of the various types of bituminous concrete pavements outlined above.

During 1911 considerable thought has been devoted to the methods and materials employed in the construction of sheet asphalt pavements. Notable work has been done by a Special Committee of the American Society for Municipal Improvements and the Committee of the Association for Standardizing Paving Specifications. Throughout the United States there appears to be crystallizing a firm belief that specifications for materials should be opened to admit such asphalt cements as "Bermudez," "California," "Pioneer," "Texaco," and "Trinidad" for instance, which have shown by service tests that excellent pavements may be constructed by their use. This tendency is commendable as thus competition is increased and the high quality of the asphalt is maintained.

Victoria Builders' Exchange Secures Charter

The Victoria Builders' Exchange Limited, capitalized at $10,000, has secured a certificate of incorporation. Among the objects for which the Exchange has been incorporated are the following: to promote the consideration and discussion of questions affecting the building trades; to confer with the legislative and public bodies upon questions affecting building trade interests; to improve and elevate the technical and general knowledge of persons engaged in building construction; to promote excellence in the construction of buildings and just and honorable practice in the conduct of business; to establish a library and collection of models, designs, drawings, etc.; to erect a suitable building for the purposes of the Exchange, and to provide facilities for social intercourse between the members.

Changes of temperature in concrete during setting have been investigated by Mr. W. D. Maxwell, assistant city engineer of Des Moines, in connection with the construction of a bridge in that city. Readings were taken on thermometers placed in pipes from 3 to 10 ft. below the top of the piers and from 3½ to 10 ft. from the outer faces of the concrete. The thermometers showed an increase of 15 per cent. to 20 per cent. within the mass during the period of setting with the maximum increase from 7 to 10 days after the concrete was poured. From that time the temperature fell steadily to normal.

Building Conditions at Calgary, Alta.

Operations Now in Full Swing—Activity Increasing as Season Advances—Much Railway and Municipal Work

Special to the Contract Record

Calgary, Alberta, April 30, 1912.

THE month of April has been an unusually busy month for Calgary. This is but a forecast of better and more permanent building to be done in the city. The building permits issued will total $1,500,000, and include permits for two first class structures, the Mackie Block, and the Anderson Apartments. Heretofore, Calgary has been content to see a great many cheap buildings erected, because first cost has been a deciding factor with the owners. But the day is coming when those who put their money into business blocks will appreciate the folly of inferior construction.

Of the work started during April, the most important is the block to be built for Mr. Mackie on Eighth avenue west. This will be a modern ten-storey office building, with stores on the ground floor. In plan the structure will be 80 feet by 130 feet, will tower 128 feet above the street grade, and will be built with standard steel cage construction, combination tile and concrete floors, with brick exterior. The foundations are to be reinforced concrete, as the situation necessitates some cantilever footings. Fyshe-Martin & Company, Limited, will do the foundations, but nothing has been done about the general contract. The architect is Mr. James C. Teague, of Calgary. The estimated cost will be $250,000.

Work was started last week on an apartment house to be built for Mr. Rex Anderson, to cost more than $150,000. The structure will be of reinforced concrete, the Kahn System being specified, and the exterior will be of brick, with limestone trimmings. In all there will be sixty-four suites, eight three-room suites and four two-room suites on each floor, with bath and kitchenette attached.

Expenditures and Contracts

On April 17, the electors authorized by-laws to the amount of over $202,000, for the following work: Sewer connections, $50,000; catch basins, etc., $20,000; conduit system, $100,000; stationary asphalt plant, $20,000; public comfort stations, $30,000; addition to city stables, $12,000. The contractors for the new pavements are now busy at work, and all the streets present a most industrious appearance. The contract for the electric sub-station will be let to the Union Building Company, Limited, of Calgary, for $16,400. Mr. H. A. Sylvester, formerly of Schnectady, N.Y., who has been in business here for the past year, will be recommended for the position of Building Inspector, at a salary of $2,500 a year.

Among the contracts let here during the month are a warehouse for Woods, Vallance & Adams, to McNeill & Trainer for $119,000; a paint warehouse for G. F. Stephens & Company, to Claydon Bros., of Winnipeg, for $30,000; the plant of the Canada Malting Company, to the Canadian Stewart Company for commission on a finished cost of $200,000. The Pioneer Tractor Company, of Winona, Wisconsin, are perfecting plans for building their own plant at a cost of some $300,000. Plans are being prepared by Burroughs & Richards, of Calgary, for the $100,000 block to be erected for the Travellers' Association. This will be a modern five-storey office building, 68 feet frontage, by 120 feet deep, facing on First street east.

The arrangements between the Dominion Government and the Grand Trunk Pacific Railway for entrance into Calgary have been announced by Mr. R. B. Bennett, K.C., M.P. In consideration of the sum of $150,000, the government will transfer to the railway, for as long as it may be used for railway purposes, the site of the Royal Northwest Mounted Police Barracks, consisting of property bounded by the Bow and Elbow Rivers, and by Sixth street east and Ninth avenue east. The railway is also to defray the cost of moving the buildings now on the site to a new location; to defray the cost of certain new buildings required; to grant to the city of Calgary for a street, 25 feet on the south and west sides of the property, thereby widening Sixth street and Ninth avenue east 25 feet; to provide for widening the traffic bridge over the Elbow River to East Calgary, and to erect suitable freight sheds and construct a station building facing down Eighth avenue at a cost between $275,000 and $300,000. This site will be a very central location and will add considerably to property along Eighth avenue, which bids fair to be the real axis of the city. The Calgary Builders' Exchange have asked the Board of Trade to co-operate with them in making an effort to get the contracts for this work let to local contractors, as there seems to be a custom to ignore the local men, and to let these large contracts outside the city, apparently on the supposition that local builders are not capable of handling such work. As a matter of fact, one has but to compare the work of the Calgary firms with work done here by outside parties to appreciate the fact that work done here by local men is equal, if not superior to the work done by others.

1,200 Miles of Light Railways Contemplated

A feature of the development of Calgary and its tributary districts will be the construction and operation of an inter-urban railway to serve these districts and to bring them closer to their home markets. The Alberta Interurban Railway has been incorporated under a Dominion Charter to operate trains on a railroad to be built by the Land Traction Company, Limited, chartered by the province of Alberta. These charters allow the railway to occupy 26 feet of the 66-foot public highways as right-of-way. On these public highways there will be stations built, with sidings, every two miles along the line, where freight and passengers will be received for transportation. This railway is expected to fill a long-felt want, that of handling produce from round about Calgary, to bring it in to be marketed, or to act as a feeder to the through heavy railways. Thus the surrounding countryside will be developed in all directions more or less equally, instead of an abnormal development as along the line of the steam railways. In all, the construction of 1,200 miles of light railways is contemplated, comprised in the following routes:—Calgary to Banff; Calgary to Medicine Hat; Calgary to the Red Deer River, via Carbon; the Medicine Hat line to Lethbridge; the Medicine Hat line to Taber; Calgary to Strathmore, Bassano and Brooks; Medicine Hat line to Wood Mountain, in Saskatchewan; Lethbridge to the Boundary Line at Milk Creek; Medicine Hat line to Macleod; Macleod to Pincher Creek.

One feature of the charters is that there is no time set for the completion of any part of the line, so that construction can proceed as is thought best. It is the intention to have the line to Carbon in operation in the fall, in all some 70 miles, going via Rock View, Yankee Valley, and Irracana.

This railway will be the most advanced type of light roads, comparing favorably with those in operation by some of the larger railroads in the United States, notably the Union Pacific. The rolling stock will be heavy combination baggage and passenger cars, as typified by the McKeen Cars, their motive power being internal combustion engines burning crude oil. One of these cars can easily handle six to eight loaded freight cars at a reasonable speed on an 8 per cent. grade. As the maximum grade will be but two per cent., these cars will undoubtedly prove highly satisfactory.

Labor Conditions

Labor continues to be scarce in the common classes and other trades are asking for higher pay. The agreement with the carpenters has to be settled upon very soon as they are asking for an advance of five cents, making the rate 55c per hour. There seems to be no indication that they will not get it, and the prospects are that the year will pass without any serious troubles.

W. W. H.

Another Building Acquisition for Montreal

MONTREAL is to have another mammoth business building—the largest in Canada—containing a total floor area of about 300,000 square feet, and costing nearly $1,000,000 for structure and land. It is to be known as the Read Building, and will be situated on the block bounded by St. Alexander street, Lagauchetiere, street, Hermine street, and Jurors street. The structure will be a ten storey and basement fireproof loft building for light manufacturing, wholesale and merchandise distribution business. Each floor will contain about 27,000 square feet superficial area, and the building will be not only equipped with every modern appliance and convenience, with sprinkler system, four freight and four passenger elevators, etc., but will be heated and ventilated in the most approved manner.

The proposed Read Building, Montreal

The syndicate which is handling the proposition has been organized by Mr. Linus G. Read, consulting engineer, and is composed of the following local financiers: Messrs. Walter Molson, George Hartt, George A. Ross, J. A. Mann, E. R. Decary, A. J. Ayer, Henry Blachford, J. W. Tatley and A. R. Pennoyer. A charter is being obtained from the Federal Government incorporating the syndicate into what will be known as Alexander Syndicate Limited, with a nominal capital or $250,000. This corporation will have rather broad powers and intends to undertake other important developments in the city.

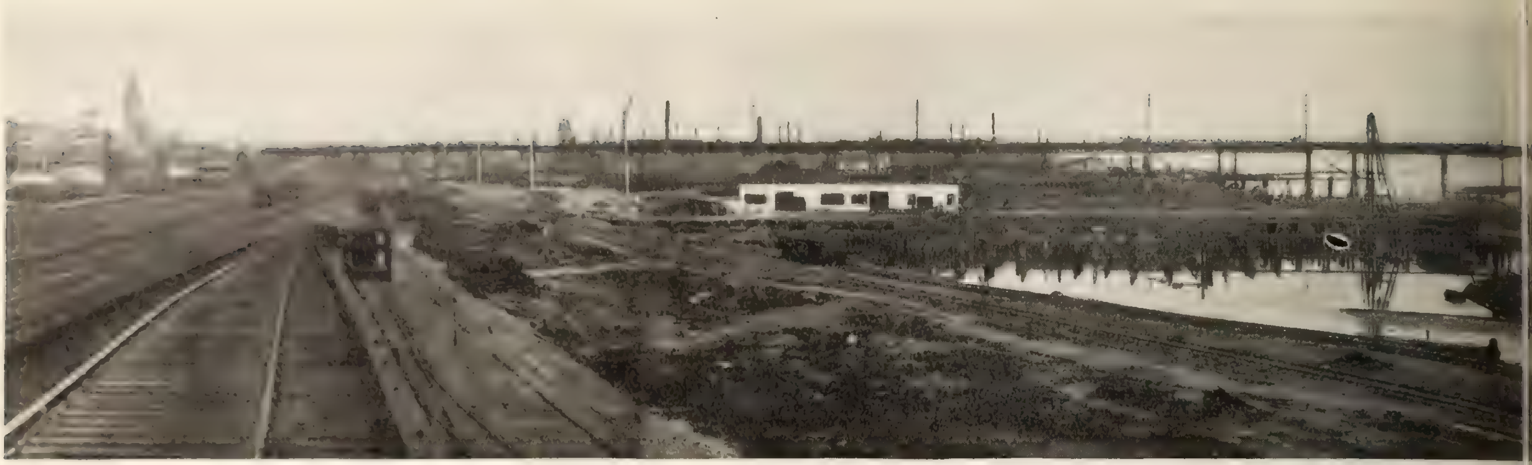
Messrs. Ross & Macfarlane, of Montreal, the architects, have worked out a most attractive design, planning an arrangement which will house on each floor a business in all its branches, executive, manufacturing and shipping departments, with every modern facility for the easiest and quickest handling of merchandise. The site is especially suited to such a building, owing to the grade of the streets, the grade of St. Alexander and Hermine streets lending itself ideally for keeping the freight entrances at the lower level, and practically all of the Jurors street facade is given up to an arrangement which will permit of twelve or fifteen large trucks driving directly into the building and loading or unloading, for incoming or outgoing freight, and all handled on a very large shipping platform, which platform is actually in the building and on the basement level.

On the St. Alexander street facade the main entrances are placed with a corridor from the lower entrance leading entirely through the building to Hermine street permitting of the most convenient entrances and exits for all employees, there being special elevators for their service. On the south east corner of Lagauchetiere and St. Alexander streets, offices, together with entrance and elevator service, will be provided for the exclusive use of the tenants and their office employees.

The building will be a strictly high-class, modern fireproof building constructed of steel skeleton frame enclosed in brick and stone walls, with reinforced concrete floors, metal casement windows and complete sprinkler system. Special attention has been given to the safety of employees, and for the first time the city of Montreal will have a building provided with a fire tower or enclosed fire escape, the type at present recommended by the fire underwriters and recently demanded by the New York City building department as the result of the recent disastrous fires in that city in which the loss of life was very great. In short, the building may be designated as a mammoth vault, not only fireproof, but equipped in every particular with the most modern appliances for light, safety, health and comfort.

Among the newly incorporated Winnipeg concerns is the Winnipeg Poured Concrete Steel Moulds Corporation, Limited, (Mr. H. A. Hood, 10 Canada Life Bldg., General Manager). As may be gathered from the style of the company the business will consist in general building work, accomplished with the use of steel forms. These steel forms are made in a unit and the units are locked together according to the design. When completed the building is practically one piece, from the substructure to the roof. These buildings are of reinforced steel and are built either with hollow or solid walls. It is claimed that they are fire-proof, water-proof, moisture-proof and germ proof. The company's statement that they are able to build houses ranging in cost from $600 to $50,000 is indicative of the wide field that they will cover. The greatest claim in regard to economy is based upon the practical elimination of skilled labor. The system is based upon the ideas advanced by Thomas A. Edison and it would appear to be the first practical consummation of this idea in Canada.

The Guilbault Company, Limited, St. Boniface, Man., has been incorporated with a capital of $150,000. The directors include Mr. E. Guilbault, contractor; Mr. R. E. Lembcke, civil engineer, and Mr. S. M. Jean, contractor. The company will carry on a general contracting business and in addition will carry a complete line of builders' supplies. Their railway facilities are of the best, they having two private sidings in their yards at St. Boniface, which cover 5½ acres of ground.



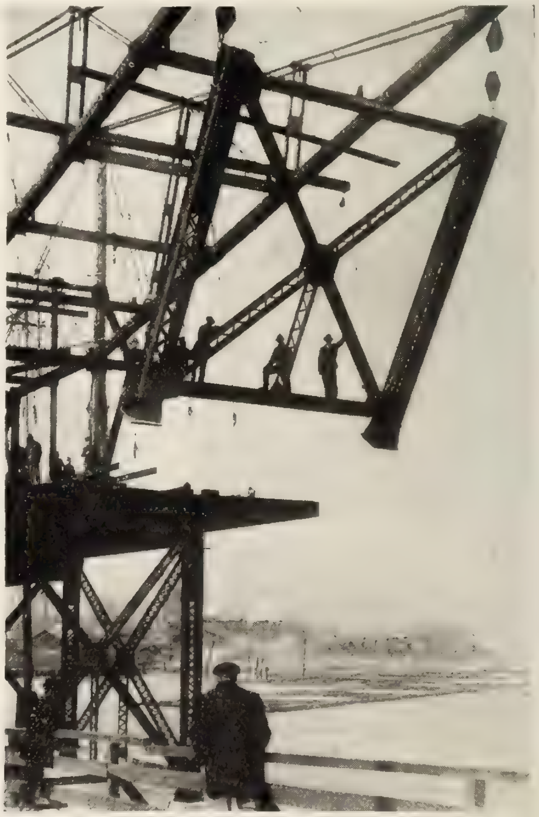
Cambie Street Bridge, Vancouver, B. C.—Panoramic view o

The Construction of the Cambie

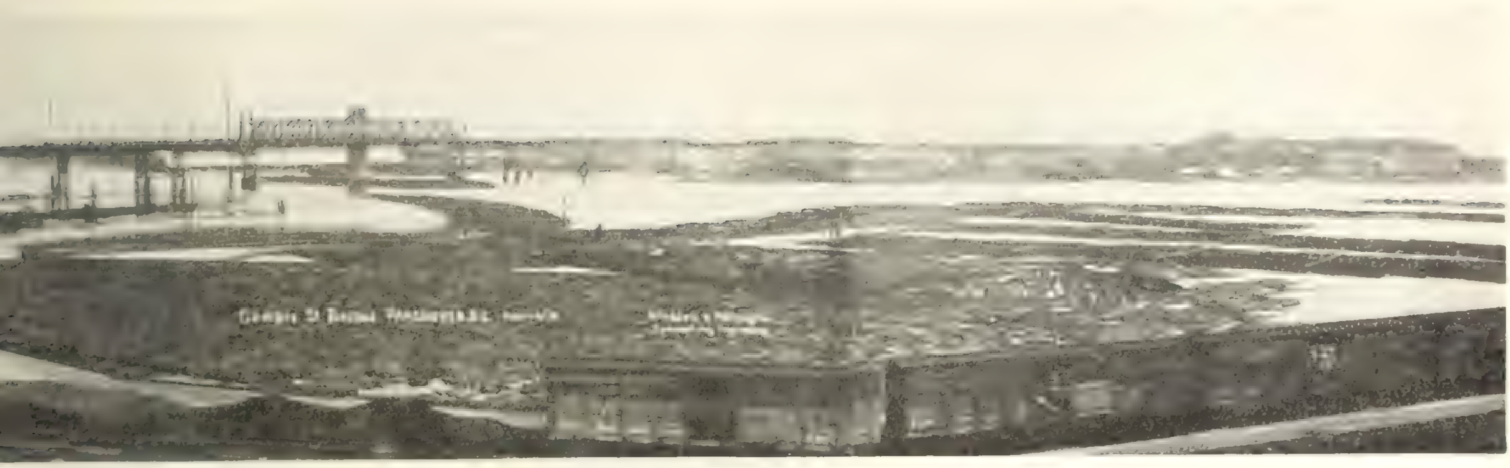
Details of Methods Employed—A St
Thousand Feet and that cost $640,000-

THE Cambie street bridge, built by the city of Vancouver from funds furnished by a specially voted bond issue, crosses False Creek from the intersection of Robson Street and Beatty Street, to the intersection of Bridge Street and Fifth Avenue, a total length of about 4,000 feet. The structure consists of a steel viaduct 3,131 feet long, built of plate girders, supported on columns, supported on concrete pedestals, resting on piles, and one through draw-span 264 feet long, supported on concrete pier, sunk to bed rock, making a total length of steel structure 3,395 feet. At each end of the steel structure there is an earth fill with concrete retaining walls. The structure provides a roadway 44 feet wide between curbs, having in its centre two street car tracks, and on each side, two sidewalks, each 6 feet wide, making a total width of roadway and sidewalk of 56 feet, providing for street car, vehicular and pedestrian traffic. The roadway is paved with creosoted blocks, which on the steel structure are supported by a floor of creosoted timber, consisting of cross ties and longitudinal plank. Where the roadway is carried across the railway tracks on Front street, the floor is of reinforced concrete entirely enclosing the supporting beams. Trolley poles are provided at each hand rail, and light brackets are supported on trolley poles. The sub-structure consists of pedestals supporting the viaduct columns, and resting, over the creek proper, on piles. The shore pedestals are carried down to hard material and are constructed without piles. The pier supporting the swing span, and the piers at each end of the swing span were sunk by the pneumatic process into hard material, to a sufficient depth to provide

Cambie Street Bridge construction, looking North from South abutment, April 26, 1911



Lowering last bent at North end draw span, April, 26, 1911



e structure upon its completion recently. March 31, 1912

reet Bridge at Vancouver, B. C.

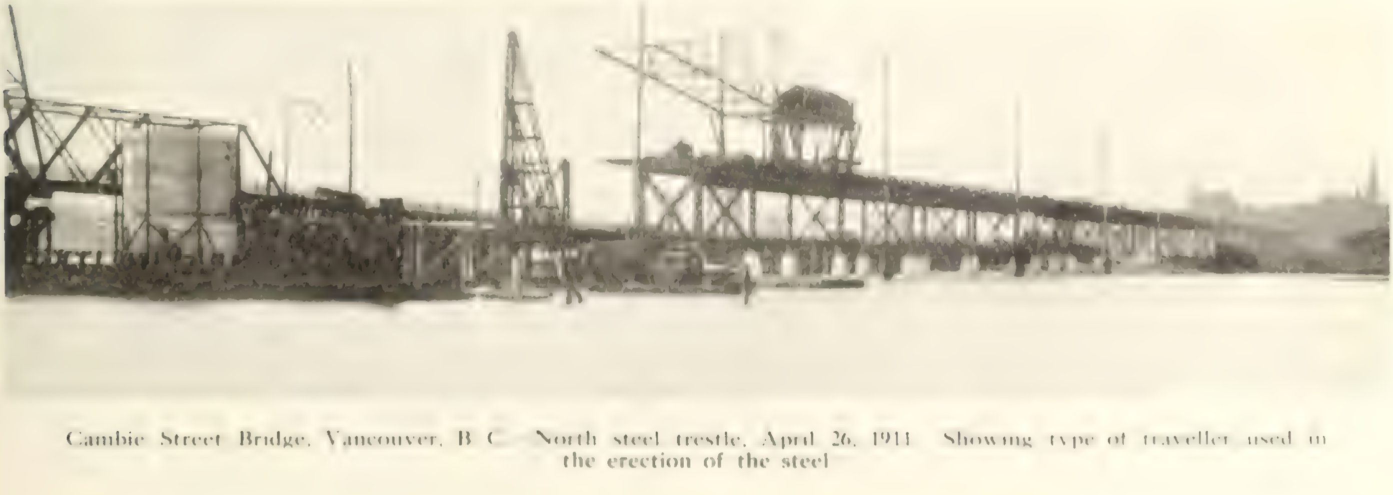
that has a Total Length of Four ned by Messrs Waddell & Harrington

for the future deepening of the channel. In the construction of the pedestals, the supporting piles were first driven, then cribs built of timber, 12 inches thick, were sunk around the piles by dredging and pumping within. This sinking was accomplished by the use of a hydraulic lift, and the cribs were weighted with stone. When a crib had reached the final depth, and the material within had been entirely cleaned out, concrete sufficient for sealing course was deposited through a tremie. When this concrete had hardened, the contained water in the crib was pumped out. As the crib had been carefully caulked, the piles were sawn off to the required elevation, and the remainder of the base concrete was placed in the opening. The forms for the shaft of the pedestals above the base were then set within the timber cribs and filled with concrete. That portion of the timber cribs above the top of base of the same general construction of the lower portion of the crib was arranged to be removed as a coffer dam, and was so removed after the completion of the shaft concrete. The daily variation of tide was about 12 feet and the process of construction was accommodated to this variation to take the greatest advantage of the low water. Pneumatic piers were constructed of timber, provided with timber coffer dams in the usual manner, and sunk without serious difficulty.

The swing span is of the centre bearing type, operated by electricity. It is of the stiff rivetted type throughout. The viaduct portion of the structure, likewise, is of simple girders, resting on columns, with towers at intervals of about 400 feet. The girder lengths are generally 80 feet and the tower spans 40 feet long.

The draw span complete contains 463 tons of steel. The girder viaduct complete contains 3,320 tons of steel. There is about 1,140 M. ft. B.M. of timber, and 9,800 sq. yds. of creosoted block pavement. The superstructure steel was manufactured and erected, and the floors were placed by the Canadian Bridge Company. There are about 13,500 cubic yards of concrete in the foundations, 3,600 lineal feet of piles. The sub-structure was constructed by Messrs. Palmer Bros. & Henning. The total cost of the entire structure complete was about $640,000.

In one of the accompanying photographs there is shown the type of traveller used in erecting the steel. The peculiarity of it was that there were no movable booms. On account of this, the bents were assembled on the top of the bridge and "telegraphed" ahead to



Cambie Street Bridge, Vancouver, B. C. North steel trestle, April 26, 1911. Showing type of traveller used in the erection of the steel their positions on the next pair of pedestals. Another picture shows the pedestals on the south shore. The view is looking north from the end of the south abutment. To the right is the city garbage destructor which was afterwards connected to the new bridge.

The steel approach at the drawspan from the north shore may be seen in another view reproduced. The drawspan was erected in place, it being high enough to allow the passage of the majority of the traffic. An opening was left in one channel for the passage of tugs and scows. This was done by using the pair of girders which served for falsework and rested on pile bents.

The panoramic view shows the entire bridge completed. The grade on the north approach or left, as seen in the picture, is level and that on the right side of the drawspan is descending .725 grade.

We are indebted to the engineers, Messrs. Waddell & Harrington, of Kansas City, for the material used in this article. Mr. C. P. Moss is resident engineer at Vancouver for Messrs. Waddell & Harrington.

Two Winnipeg Interiors

The accompanying illustrations are reproduced from photographs of the interiors of two of Winnipeg's latest office buildings, the Northern Crown Bank and the Alloway and Champion Building. For the photographs we are indebted to the Western Steel & Iron Company, Limited, who executed the contracts for the architectural iron work and bronze. In the Northern Crown Bank this contract included the installation of electro-plated stairways, while in the Alloway and Champion interior the solid bronze counter railings seen in the photograph comprised a portion of the work.

Interior Northern Crown Bank, Winnipeg

Interior Alloway and Champion Building, Winnipeg

A German technical paper devoted to the installation of steam boilers and engines has recently published an article dealing with the increasing use of reinforced concrete as a substitute for brick in the construction of boiler foundations, flues, and setting generally. For tubular boilers a 15-in. double wall is recommended, the inner 5 in. thick, and the outer 6 in. thick, with an intervening space of 5 in., the wall reinforced vertically and horizontally by a network of round bars, and the two elements of the wall kept in their correct relative positions by distance pieces. Any walls in direct contact with flame should be not less than 12½ in. thick, and constructed independently to the outer walls so that they can be renewed or repaired as occasion demands. The recognized advantages of reinforced concrete for the purpose are stated to be excellent insulation and economy in both first cost and maintenance.—Ferro-Concrete.

Surfacing Concrete Walls

Surface-facing coats of rich concrete for concrete walls are not as satisfactory as walls having uniform mixture throughout, according to the experience of Mr. Lincoln Bush, consulting engineer, New York, related in a memorandum to the committee on masonry of the American Railway Engineering Association, which is given in that committee's last report. His observations on walls built for the Lackawanna Railroad during the period from 1900 to 1909 have shown that walls built with a uniform 1:3:5 mixture between 1903 and 1909 have given better results than those built between 1900 and 1903, when the practice of that road was to use a 2-in. surface finish of 1:2:2 mixture against a body of 1:3:5 concrete. Defects and shelling off of the face may not take place for two or three years, it appears, and may then continue. Where a special surface finish is necessary for ornamentation, he believes it best to obtain it by bush hammering, treatment with acid, or rubbing and washing while the concrete is green, using crushed stone of proper size to give the desired surface effect.

A puddle trench 1600 ft. long and 12 ft. wide has been sunk to a maximum depth of 110 ft. below the original surface of the ground in connection with the construction of the Ogden reservoir of Bury, England. There are 36,140 cu. yd. of puddle and 4152 cu. yd. of concrete in the trench and a puddle wall extends above it, 60 ft. up into the section of the earth dam. This wall varies in width from 17 ft. at the base to 7 ft. at the top and contains 17,120 cu. yd. of puddle. According to the "Surveyor" the main embankment of the earth dam is 1200 ft. long and 65 ft. high and covers an area of about 7 acres. It has a top width of 20 ft. and a maximum base width of 365 ft. and contains 243,000 cu. yd. of material. The upstream slope is 3:1 with heavy masonry paving surmounted by a storm wall 1030 ft. long and 4 ft. high. The downstream slope is 2½:1 and is benched and seeded.

An Important Action Affecting Liability of Sub-Contractors

On April 29 the Court of Appeals, Montreal, gave judgment in a case involving $1,340,000 which has been before the courts for twelve years. The action has reference to the construction of the Chambly Company's power house and dam, erected across the Richelieu River. This dam collapsed, owing to the presure of the water proving too great to be withstood by the structure. The contract had been entrusted to the Stillwell Bierce Company, of Dayton, Ohio, who in turn sublet the concrete work to Peter Lyall. According as section after section of the dam proved its unworthiness the Montreal Light, Heat & Power Company, which had absorbed the Chambly Company, entered action for damages against the contractors. These latter in turn called Peter Lyall in as defendant in warranty, maintaining that he was the one actually responsible for the defective construction of the dam, and thus should meet the suits as they were entered. The Stillwell Bierce Company, however, went into insolvency, and then, it appears, an arrangement was entered into with the power company whereby the contractors were to proceed with the suits against Peter Lyall on the understanding that they should turn over to the power company whatever damages they might be awarded against the latter. The aggregate claims, as stated, totalled $1,340,000, and the whole case resolved itself into a question of what the liability of a sub-contractor was in the matter of guaranteeing work done. Was such sub-contractor to be held as falling under the article of the code governing the ten-year guarantee to be given by contractors and architects, to the proprietor of the structure, or was he to be considered as acting solely as the agent or workman of the contractor, with the latter alone responsible to the proprietor in regard to the guaranteeing of the work done? When the case finally went to proof before Mr. Justice Tellier, in November, 1906, after much preliminary work, it occupied the attention of the tribunal for several months, being finally taken en delibere in April, 1907. Mr. Justice Tellier had the matter under advisement for a period of one year before he finally rendered judgment adversely to the interests of the plaintiff. The lower court upheld Peter Lyall on all points. The work done by him had been done by the cubic yard, and under the supervision and after the plans of the contractors and architect. According to G. Massey, who was chief engineer of the works at the time, Peter Lyall had done the work strictly in accordance with the plans, and had in no way failed to carry out the portion of the work entrusted to him. Thus, as a sub-contractor, he could not be held as responsible to the proprietor, the contractors alone having responsibility.

The matter was, in due course, taken to appeal, and the ruling of Mr. Justice Tellier was sustained in the main, Mr. Justice Gervais rendering judgment in the name of his colleagues. It is understood that the case will be taken to the Privy Council to be threshed out anew before the latter body.

Simplex Concrete Piling

This system of piling, which has been largely used in all parts of the United States, and also in Europe, was first used in Canada in 1906, when about 135 piles were driven for the foundation for a coal handling plant for the Dominion Coal Company at Windmill Point, Montreal. In this case the piles were driven with a 40-foot steel tube 16 in. in diameter and ¾ in. thick, the bottom of the tube resting on a conical cast iron point, and being driven to a suitable bearing under a 3000 lb. drop hammer operated in a pile driving frame. Practically the entire weight of the hammer is delivered to the point, giving full value to the penetration, equal compression of the soil all the way down, and developing the full bearing value of the soil from top to point. When the required depth is reached, the form is filled by means of drop bottom bucket with soft concrete to a sufficient heighth and quantity to fill the pile hole to the proper level. The form is then pulled out, leaving the point in the ground, the concrete being forced down and out by its own weight, completely filling the hole to its compacted wall. The concrete is always placed before the removal of the form, and there is no shell left in the ground, the concrete being moulded against the rough compact wall of the pile hole, admitting of tremendous skin friction in addition to its end bearing. The form with its point effectually excludes water and holds the soil until the concrete is deposited, after which the form is withdrawn, allowing the concrete to harden in intimate contact with the soil. Resistance to driving is due to end bearing only, while the rough surface of the finished pile developes the full frictional value of the soil in addition.

Simplex Concrete Pile under test of 60 tons

An additional foundation for the Dominion Coal Company, comprising 400 piles, has been finished recently. In 1906 315 piles were driven at Stratford, Ont., for the Grand Trunk Railway there, and in 1909 about 200 piles were driven at Hamilton, Ont., for the Canadian Westinghouse Company, both these jobs being on the above system.

In the last few months, two foundations were driven on the Montreal Harbor Front, one 685 piles for Harbor Shed No. 16 and the other 1325 piles for an annex to Harbor Elevator No. 2. On the latter works, piles were driven to an extreme depth of 58 feet in filled ground. On the Harbor Front moulded piles were used. These piles were moulded horizontally, being [illegible] forced from end to end with four twisted steel bars. In this case the steel tube was first driven, after which the moulded pile was inserted in the tube, then a quantity of grout was poured in sufficient to fill the space between the pile and the ground, after which the tube was removed. In the case of piles over 40 feet long it was necessary to use a second steel form, which was connected with the lower one by means of a steel pin passing through both sections. Four tests on the individual piles were made for the Harbor Commissioners, one 46 tons showing no settlement, one 50 tons showing a settlement of ¼ in., one with 50 tons showing a settlement of 3/16 in., and a fourth of 60 tons, which showed no settlement. There are one or two other methods employed in connection with this system of pile, but up to date those described are the only ones that have been used in Canada.

Personal News and Notes

Crushed Stone and Gravel Limited, Saskatoon, Sask., have obtained a charter with a capital of $200,000.

A charter has been granted to the Canadian Western Builders' Supplies, Limited, Saskatoon, Sask., capitalized at $40,000.

The Main Drive is the title of a booklet received from Federal Engineering & Supplies, Limited, devoted to the merits of Scandinavia belting.

The Northern Dredging and Construction Company, Limited, Loggieville, N.B., has secured articles of incorporation. The concern is capitalized at $250,000.

Mr. L. R. MontBriant, architect, has been selected as Conservative candidate for the St. James division of Montreal, in the coming Quebec provincial elections.

Work has been started on the improvements of the Canadian Northern Railway Company's yards at Saskatoon, Sask. The cost of the work is estimated at $250,000.

Alterations costing $10,000 are being made at the residence of Sir Mortimer Clark, of Toronto. The architect is Mr. J. Wilson Gray. Messrs. Brown & Love have the general contract.

Nearly five hundred bricklayers went out at Hamilton on May 1 for higher wages. At the time of writing there is every prospect of a quick settlement. The Union demand is for 55c. an hour.

Mr. A. E. Nutter, City Architect of London, Ont., has resigned and the position has been abolished. A new appointment will be made to the office of Building Inspector. The name of Mr. John Shopland is mentioned for the post.

Among recent incorporations at Toronto is that of the Union Electric and Contracting Company, Limited. The capital of the new concern is $150,000 and the directors include Messrs. A. Moore, C. A. Lewis and H. C. French, all of Toronto.

Saskatoon is experiencing the greatest building year in its history. Plans already prepared involve an expenditure of $5,000,000. There is every likelihood that the estimate of $7,000,000 for the year's total, made earlier in the season, will be surpassed.

The building permits issued at Montreal during the month of April totalled $2,314,021, compared with $1,711,971 for April, 1911. The total for the year to date is $3,745,180, as compared with $3,822,136 for the corresponding period of last year.

Surveys are now under way for double-tracking the Canadian Pacific main line between Vancouver and Calgary, a distance of over 600 miles. This is one of the most extensive improvements undertaken by the Canadian Pacific since the completion of the main line, and will involve the expenditure of millions of dollars within the next four or five years. The work will be in charge of F. F. Busteed, with headquarters at Kamloops, B.C.

It is reported that the Hudson's Bay Company are having plans prepared for what will be the finest departmental store in the western half of Canada. The proposed building, according to the present intentions, will be six storeys high and will cost $1,500,000.

It is rumored that officials of the Pere Marquette Railroad are investigating the condition of the roadbed of the London, Ont., and Port Stanley line with a view to rebuilding the stretch of track. Mr. W. K. Tasker, Port Huron, Mich., is Superintendent.

The Ruggles-Coles Engineering Co., 50 Church street, New York City, and McCormick Building, Chicago, have appointed the London Concrete Machinery Co., London, Ont. as their agents for the sales of the Ruggles-Coles portable dryer and heater for road work.

Mr. R. H. Thompson, of Seattle, who has been engaged by the Provincial Government of British Columbia to prepare a scheme for the development of Strathcona Park, Victoria, B.C., believes that this park will eventually eclipse anything of the kind in the United States or Europe.

The cost of building the new roundhouse at Coquitlam, B.C., by the Canadian Pacific Railway, will be $50,000. This is only a portion of the extensive work the company is undertaking at this place. In all, the improvements, yards and buildings will mean an outlay of about one million dollars.

Work is to be started this summer on the proposed line of railway from Montreal to the mouth of the Nottaway River on the James Bay. Preparations are now being made to send in supplies by boat so as to begin construction in the bay terminus as soon as possible. Mr. F. H. Clergue, Sault Ste. Marie, Ont., is interested.

According to a report from Edmonton, Alta., Mr. Lawrence Chipman, engineer-in-charge of a locating party on the road of the Edmonton-Dunvegan and British Columbia Railway was drowned in the Athabasca River on April 8th while attempting to cross on the ice from Mirror Lake. A careful but unsuccessful search was made for the missing engineer.

Operations were commenced last week under the engineer, Mr. E. A. James, upon the extensive work planned by the Good Roads Commission. A force of one hundred men with seven road outfits was divided among various highways in York County. Mr. James states that, weather permitting, one-half mile of road fit for traffic will be constructed weekly.

Speaking in Montreal, the Hon. F. D. Monk announced, in connection with the proposed Hudson Bay Railway, that there was to be steamship connection across to James Bay, and that from that point the Federal Government had decided to subsidize the construction of a line to connect with the Transcontinental, from which point there would be a branch line to Montreal.

Recent British Columbia incorporationes include: Booker, Campbell & Whipple Limited, Vancouver, building contractors, capital $50,000; Howes-Proctor Company, Limited, Vancouver, general contractors, capital $10,000; Priest Home Building Company Limited, Vancouver, building contractors and investors, capital $10,000; Interlocking Concrete Construction Company, Limited, Vancouver, capital $100,000.

An immense "good roads" scheme is under consideration by the Alberta Government. Steps will be taken for the construction of roads from Calgary to Banff; Calgary via Thigh Hill to Macleod, and thence to Pincher; Calgary to

Lethbridge, thence south to the international boundary, near Milk River; Calgary to Taber; a crossline, Taber to Lethbridge; Calgary to Medicine Hat, and Calgary to Strathmore, Bassano and Brooks.

The Canadian head office of Messrs. Escher Wyss, of Zurich, Switzerland, will remove on May 15th from 408 Lumsden Bldg., Toronto, to 514-515 Canadian Express Bldg., Montreal. The company are well known as manufacturers of water turbines, impulse wheels, centrifugal pumps, Zoelly steam turbines, paper and pulp machinery, air compressors and refrigerator machines. Mr. C. L. Trimingham, Winnipeg, is the company's agent for Manitoba, Saskatchewan and Alberta. The agents for British Columbia are Messrs. Frank Darling & Co., Vancouver.

The illustration shown herewith is a view of the new Winnipeg warehouses of Messrs. H. W. Johns-Manville Company, of 100 William Street, New York, whose increased business has necessitated their removal from their old quarters at 320 Main street to more commodious premises at 89 Princess street, Winnipeg. The branch will be in charge of Mr. M. C. Burgess.

H. W. JOHNS-MANVILLE CO. LIMITED
ASBESTOS AND MAGNESIA PRODUCTS

New Winnipeg Warehouse of the Johns-Manville Company, New York.

According to the report of the Delegation of the Regina, Sask., Board of Trade, which recently returned from Winnipeg, Man., a new railway line with Regina as a terminal point will be constructed by the Canadian Northern soon. It will enter the Goose Lake country over a route that has not been definitely fixed. The new line will join the Goose Lake line at Rosetown, but the terminal will remain at Regina. It was not definitely stated when the work on this line would be commenced.

Representatives of the Dominion and British Columbia Governments, also members of the local authorities and private owners of waterfront property, met in the Vancouver City Hall on Wednesday, May 1st, for the discussion of the formation of a Harbour Trust. It is determined that Vancouver shall not be lacking in initiative in preparation for the opening of the Panama Canal. The suggested Harbour Trust would take charge of development and harbour business on all parts of Burrard Inlet and False Creek, and also on the North Arm of the Fraser River.

In the competition inaugurated by the Provincial Government of Manitoba for plans for the Parliament Buildings at Winnipeg, estimated to cost $3,000,000, sixty-six sets of plans were submitted. The assessor was Mr. Leonard Stokes, President of the Royal Institute of British Architects, who came to Winnipeg for the special purpose of judging the plans. The five firms selected to complete their plans, upon which the final award will be made, are Messrs. Brown & Vallance, Montreal; Messrs. E. & W. S. Maxwell, Montreal; Messrs. Sharp & Brown, Toronto; Messrs. Clemeshaw & Potuall, Regina, and Mr. F. W. Simon, Liverpool, Eng.

In connection with the proposed C. N. R. tunnel under Mount Royal, Mr. Thomas Iverson has received a contract for making a topographical survey of the company's projected model city, preparatory to making plans for road-making, drainage, water mains, etc. This survey will probably take until the end of May, and then the Land Department of the C. N. R. proposes to spend $45,000 on the diagonal main business street, which traverses the Model City and crosses the station square. Plans for macadamizing it and for laying it in asphalt are both being considered, and when that is decided and the survey completed tenders will be called for.

Announcement is made by officials of the Grand Trunk Pacific that preliminary contracts have been let by the company for the construction of the big dry-dock and shipbuilding plant at Prince Rupert. Contracts for the building of the piers, landing stage, building platform and launching ways have been given to the British-American Construction Company. An order for 4,000,000 feet of lumber has been placed with the Lester W. David Company, Ocean Falls, and it will be shipped direct from there to Prince Rupert. Some 5,000 piles specially treated are to be used in the construction of the wharves. The new dock will have a lifting capacity of 20,000 tons, and will be capable of accommodating the largest vessels on the Pacific Ocean.

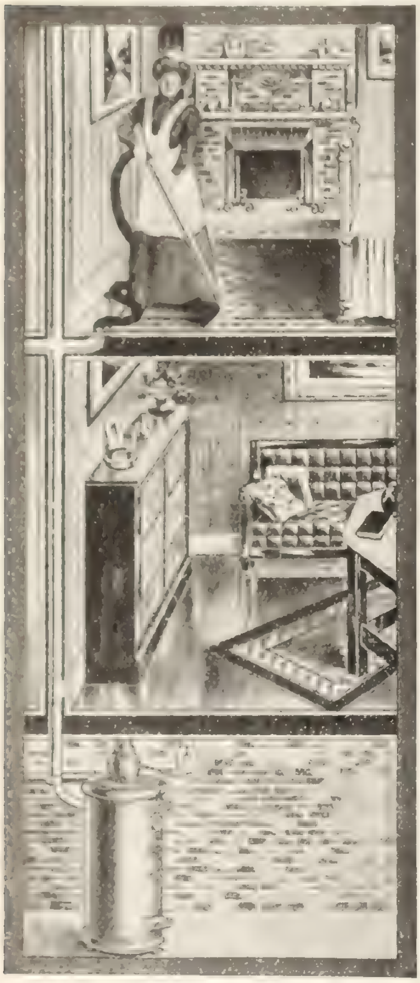
Publications Received

Reinforced Concrete Buildings; by Ransome & Saubrey; published by the McGraw-Hill Book Company, New York; price $2.50. A treatise on the history, patents, design and erection of the principal parts entering into a modern reinforced concrete building. The scope of this book is wide, but the work will be of the greatest value to the experienced engineer. Part 1 contains an account of the history of reinforced concrete, with special reference to the patents granted by the United States. Part 2 is devoted to the rational design of reinforced concrete buildings. Here the theoretical analysis has been made as brief as possible, the solutions of the equations being given without the intermediate steps which are not required by the practical engineer. Part 3 is devoted to the practical construction and will be of interest to many readers of this journal. The general principles of the "Unit Construction" are given concisely and clearly. A chapter on fireproofing and repairs should be of interest, and the superintendents' specifications have proved valuable on a number of large contracts. A chapter is devoted to noteworthy failures, which is illuminating as to the common causes of accidents.

Centrifugal Pumping Machinery; by Carl George de Laval; published by the McGraw-Hill Book Company, New York; price, $3.00. The theory and practice of centrifugal and turbine pumps. The object of the book is to furnish accurate and definite information which can be used in actual design. The data given are based upon experience in design, construction and installation of this type of pumping machinery. The underlying principles are stated in a manner which if properly applied and used will give the designer enough information to enable him to calculate results with reasonable certainty.

An Efficient Vacuum Cleaning System

We were interested in witnessing the other day at the office of Mr. James J. Martindale, 112 Mail and Empire Building, Toronto, some remarkable efficiency tests of the Tuec air cleaning system as demonstrated by the stationary machine manufactured by The United Electric Company, of Canton, Ohio. Under this system the building is piped by horizontal mains in the basement connected to vertical risers located at convenient points, these risers having valves on the various floors for the reception of the terminal of a particularly light but strong hose and the machine is located in the cellar. Under a steady and powerful suction, air at the rate of 80 cubic feet (or 140,000 cu. in.) per minute is drawn through the cleaning tool into the pipes and finally into the machine. The magical rapidity with which refuse flies to the large openings of the tools and disappears therein to be carried to the receptacle in the basement, and the thoroughness with which small and large pieces of dirt are separated from floors, carpets, curtains and walls, are conclusive proof of the claims made for this machine by the manufacturers.


The TUEC Stationary Air Cleaning System

While the initial cost of piping a building for the Tuec system must be taken into consideration, the ultimate economy of the system is unquestionable, both from a monetary and health standpoint. Carpets, floors and tapestries have their life increased very noticeably by their greater cleanliness, the labor in the home or building is materially lessened and the health of the inmates is greatly improved by the fact that during the operation of the machine, the vitiated or dead air is exhaused out of the building at the rate of 4,800 cubic feet per hour per tool. Apart from its efficiency the machine is to be commended for its low operating cost and its simplicity. Under a recent test a one-half horse-power Tuec stationary cleaner was run continuously for one hundred days (the equivalent of 2,400 hours of continuous service, or one hour's cleaning a day six days a week for seven years and seven months), at the end of which period the machine was in perfect condition and showed no measurable wear.

The Tuec machine has come into wide popularity in the United States. At Detroit recently, the School Board, wishing to purchase two machines, carried out a number of exhaustive tests of various systems, held under the supervision of mechanical experts and engineers. The award was given to the Tuec, which scored 97.6 points on the following requirements: 80 cubic feet of air capacity per minute at each orifice; one inch of vacuum just inside each orifice; power consumed; simplicity of design and construction; cost of maintenance and repair; efficiency of lubrication; noise; tools; hose; floor space occupied.

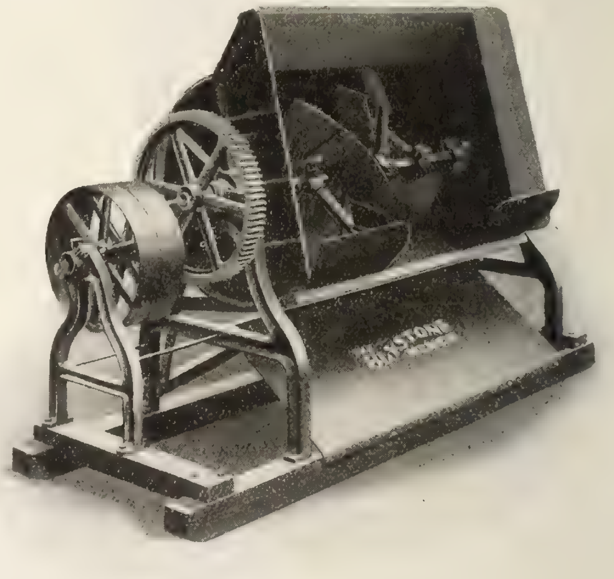
It is noteworthy that the Tuec system has been specified for the 17-storey office building now being erected at King and Yonge streets, Toronto, for the Canadian Pacific Railway.

The TUEC commercial truck machine is also made for use in large buildings, where elevators are installed, and where as an example it is inadvisable to erect the piping through concrete floors.

Further particulars and estimates may be obtained of Mr. Martindale, 112 Mail and Empire Building, Toronto.

Blystone Concrete Mixer

An exhibit which has attracted considerable attention at the recent large cement shows in the other side of the border is the Blystone batch concrete mixer, manufactured by the Blystone Machinery Company, of Cambridge Springs, Pa. The requirements filled by this mixer are simplicity in construction, thoroughness in mixing and moderation in price. Its inventor, Mr. P. L. Blystone, himself designed the machine, after much patient experimental work. It is claimed for the "Blystone" that it embodies all the essentials that add to the real worth of a concrete mixer, and yet at the same time that it is a most simple machine. It is charged with material while in motion. In discharging the batch it is not necessary to stop the machine—the revolving paddles scrape out the drum completely as soon as the mixer is tilted into a discharging position. The batch is always in full view of the operator, thereby eliminating the possibility of error in wetting the material. The capacity of the mixer is one quarter cubic yard per batch, and the batch can easily be mixed in one minute, wherein the paddle shaft revolves 20 times, thus shovelling the material completely, over 40 times, not only up through from the bottom to the top of the trough, but also forcing it the full length of the mixing drum and back again with each revolution of the paddles. Another point is the ease with which the "Blystone" can be cleaned. The mixing trough being entirely open it is as easily cleaned as a wheelbarrow. A few pails of water thrown into the mixing drum, operating the machine and then dumping, accomplishes its cleansing. The mixer is made of very heavy castings throughout. The paddle arms are of malleable iron hung on a cold drawn steel hexagon shaft.



The Blystone Mixer

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Cobourg, Ont.
Tenders will be received by clerk until May 14, 1912, for the construction of sewage disposal works. Forms of tender, plans and specifications may be had at the office of the engineer or clerk. Lowest or any tender not necessarily accepted. Owner, The House of Refuge, Cobourg. Engineer, T. Aird Murray, 303 Lumsden Bldg., Toronto. Clerk, Neil F. MacNachtan.

Dutton, Ont.
Tenders will be received shortly for the construction of pavements to cost $7,000. Engineer, J. A. Bell.

Exeter, Ont.
Tenders for the construction of 3,000 ft. of vitrified sewer pipe will be received until noon, May 10, 1912. Plans and specifications may be seen at the office of the engineer or clerk, also forms of tender. Lowest or any tender not necessarily accepted. Engineer, F. W. Farncomb, London. Clerk, T. B. Carling, Exeter.

London, Ont.
Tenders will be called for sidewalks to cost $7,000. Plans and specifications may be seen at the office of the city engineer for the new cement walk on Main street to be constructed very shortly. Engineer, Geo. Wright.

Moose Jaw, Sask.
Sealed tenders marked "Tenders for Paving" will be received by City Commissioners, Moose Jaw, until 12 o'clock noon, May 15th, 1912, for laying of approximately 34,000 sq. yds. pavement. Plans and specifications may be obtained from engineer. Lowest or any tender not necessarily accepted. Engineer, J. Antonisen. City Commissioners, A. W. Mayberry, L. W. Rundlett, W. F. Heal.

Regina, Sask.
Tenders will be received by City Commissioners until noon, May 15th for the following sewage disposal works: The construction of two filter beds, one Stand Bye Tank, pipe lines connecting with various parts of the works. A marked cheque for $2,500 to accompany each tender. Forms of plans and specifications and tenders may be obtained at the office of the engineer. Lowest or any tender not necessarily accepted Chief engineer, J. N. Mackay.

Sarnia, Ont.
The town council will take up the matter immediately of installing electrically operated pumps for their waterworks system at a cost of $50,000. Mayor, Mr. McGibbon. Engineer, Mr. Mc Lean, Sarnia.

Sault Ste. Marie, Ont.
Tenders will be received by city clerk addressed to the Mayor until May 27th nineteen o'clock, for supplying and laying of about 21,000 ft. of tile sewer pipe, with appurtenances. Specifications and plans may be seen at the office of the city engineer. Marked cheque equal to 5 per cent. of amount must accompany each tender, and be made payable to City Treas. A bond to the amount of tender, and be made payable to City Treasurer. A bond to the amount of $5,000 or in lieu thereof a cash deposit of 10 per cent. of the amount of tender will be required of the successful bidder. Mayor, W. H. Munro. Engineer, W. W. Van Every. City Clerk, C. J. Pim.

Sherbrooke, Que.
Tenders are called until May 17th for granolithic sidewalks to cost $15,000. Plans and specifications may be seen at the city engineer's office, 57 Wellington street, Sherbrooke. Received by E. J. Griffith, Sherbrooke. Engineer, Thos. Tremblay.

Thorold, Ont.
The town council have passed by-law to raise funds for the paving of Front and Albert streets, and have practically decided that this will be a brick pavement. Engineer, Chipman & Power, Mail Bldg., Toronto.

CONTRACTS AWARDED

Port Stanley, Ont.
Contract is awarded for waterworks, pumphouse, etc., to cost $50,000. Engineers, J. A. Bell & Son, St. Thomas, Ont. Brick construction. Excavation, Williams & Walter, Oneida. Mason, J. Stanfield, London, Ont. Pumps, Canada Foundry Co., Toronto. Lead pipe, Canada Metal Co., Fraser avenue, Toronto.

Toronto, Ont.
Contract is awarded for Garrison Creek sewer section 10 and 11, to W. J. Gawne, Cleveland, Ohio. The above sections extend from Garrison Creek, west to Dufferin street along Liberty and Springhurst. Engineer, City Engineer, City Hall.

Railroads, Bridges and Wharves

Guelph, Ont.
Tenders will be received by clerk until May 15th, 1912, for construction of reinforced concrete bridge and viaduct for foot traffic on Hefferman street over C. P. R. tracks. Plans and specifications and forms of tender at engineer's office. Cheque for $100 must accompany each tender. Engineer, J. Hutcheon. Clerk, T. J. Moore.

Kincardine Township, Ont.
Tenders are called to re-construct bridge (cement floor and abutments, iron top). Received until May 22, 1912. Plans and specifications may be seen at Clerk's office. R. B. Campbell, Armow, Ont.

London, Ont.
A committee has been appointed with Mayor Graham as chairman, to wait on government and to obtain charter for an electric railway from London to Port Burwell via. Aylmer, Ont. Estimated cost will be $700,000. Plans will be prepared by Engineer Glaubitz, of London, Ont.

Owen Sound, Ont.
Tenders will be received by the Engineer until 15th May, 1912, for construction of Dennys Bridge over Saugeen River. Plans, specifications and form of tender may be had from engineer or from R. H. Dobson of Southampton, and D. Izzard, Port Elgin, Ont. Engineer, Mr. McDonald, Owen Sound.

Sault Ste. Marie, Ont.
Extension of time for channel work. Sealed tenders addressed to secretary and endorsed "Tender for Widening Lower Entrance Channel Way, Sault Ste. Marie Canal" will be received at the above department until Friday, May 20th, sixteen o'clock. Plans and specifications may be seen at the office of the Chief Engineer, Ottawa, and at Sault Ste. Marie in the office of the Engineer-in-charge. Tenders must be made on specified forms and accompanied by an accepted bank cheque for the sum of $2,500 made payable to the order of the Minister of Railways & Canals, to be forfeited if the tenderer declines to enter into work. Dominion Government, (Dept. Railways & Canals). Secretary, L. K. Jones.

Weyburn, Sask.
The town is contemplating the building of two dams each 200 ft. long, 12 ft. high across Souris River at an estimated cost of $8,000. Town clerk, G. Ross. Engineer, N. Murray.

CONTRACTS AWARDED

Malton, Ont.
Contract is awarded for bridge (concrete abutments and floors) over Mimico Creek on the town line between the counties of York and Peel near the village of Malton for the Counties of York and Peel. Engineer, Frank Barber, 57 Adelaide street east, Toronto. Contractor, Jno. Ritchie, Beamsville (abutments). [illegible] Structural [illegible] (steel work). Approximate quantities, concrete abutments, 213 cu. yds., steel rods, 360 lbs., concrete floor, 116 sq yds., expanded metal, 1200 sq. ft. Dry excavation 200 cu. yds.; under water, 140 cu. yds.

Public Buildings, Churches, Schools, etc.

Barrie, Ont.
Tenders will be called for school to cost [illegible] for Barrie High School Board. Architect, Stewart & Witton, [illegible] Hughson street, Hamilton. Brick and concrete construction, stone foundaion.

Belgrave, Ont.
Tenders will be received by Henry Hopper until May 11, 1912, for extensions to the Foresters Hall.

Dundas, Ont.
Plans have been prepared for Sunday School Bldg. to cost $6,000, for St. James Anglican Church, Hart street. Architect, C. A. Peene, Hamilton. Local officials, Rev. E. A. Irving, W. H. Bates, E. A. Woodhouse. 2-sty., 60 x 35, cement construction, electric light, hot air heating, modern in every detail.

The Methodist Church Board are planning additions to Sunday School to cost $3,000. Secretary, W. H. Moss, Dundas. 2-sty., brick construction, modern heating and lighting. For further information write the secretary.

Hagersville, Ont.
The High School Board are planning to build an addition to their building to cost $4,000. 2-sty., 20 x 20, brick construction, stone foundation, shingle roofing.

Medicine Hat, Alta.
Tenders are called for Knox Presbyterian Church. Cost $12,000. Architect, Geo. Trimble, Medicine Hat. Brick fndn., brick constr., hot air htg., gas and elec. ltg., shingle roof, maple floors, 49 x 73.

Tenders will be called for school to cost $6,500. Architect, W. T. Williams, Medicine Hat, Alta. 2-sty., cement and stone foundation, brick construction, gas light, shingle roofing.

Montreal, Que.
Hochelaga R. C. School Commissioners will add two wings to present building, 32 x 69, also 4 storeys, brick construction. Plans have been prepared by Architect, Dalbe Viau, St. Gabriel street.

Plans are prepared for school on Gilford street, for R. C. School Commissioners, Parish of St. Stanislas. Architect, Alphonse Vance, 15 St. Lawrence Blvd. Brick construction.

St. Catharines, Ont.
Plans are in preparation for the erection of a Sunday School to cost $15,000. Arch., A. E. Nicholson, Queen St., St. Catharines. 2-sty., 40 x 80, stone foundation, stone construction, electric ltg., steam heating, shingle roofing, ash finish. Tenders, which will be called shortly, will be received by architect.

St. Pierre Aux Lien, Que.
The Metropole Abattoir Co., Ltd., Montreal, directors, A. Augrinon, F. Monette, M.P.; J. A. Major, J. B. O. Lieare, J. Augrignon, are contemplating the erection of an abattoir to cost $250,000.

Saskatoon, Sask.
Plans are being prepared for Lodge and offices to cost $24,000, on Nutana for The Order of Owles. Architect, Buckenhagen & Turnbull, Saskatoon. Frame construction, concrete foundation, steam heating, electric lighting, pitch and gravel roofing, gymnasium, swimming pool.

Sealed tenders addressed to City Commissioners, will be received until Tuesday, June 25th, 4 p.m., for the complete installation (including all buildings) of a 70-ton per 24 hours incinerator plant, and must be guaranteed for operation for a period of 3 months after completion. Tenderers will supply their own plans and specifications and must be accompanied by a marked cheque for 5% of amount of tender, to be returned if unsuccessful in tender. City Commissioners, J. Clinkskill, W. B. Neil, E. M. Snell.

Sherbrooke, Que.
St. Patricks Church Congregation have had plans prepared for the erection of a church on King street to cost $25,000. Architect, L. N. Audit, Sherbrooke. Stone foundation, brick construction, hot air heating, electric ltg., slate roofing.

CONTRACTS AWARDED

Calgary, Alta.
Church to cost $16,000 on Hillhurst street, for St. Barnabas Congregation. Architect, Leo. Dowler, Calgary. Gen. contractor, W. H. Cawston, cfo architect. 1-sty., brick veneer with stone buttresses, concrete foundation, hot air heating, electric light, shingle roofing, hardwood finish.

Chesley, Ont.
Post office to cost $12,000. General contractor, W. Gilpin, Wiarton, Ont. 2-sty., brick construction, stone foundation, electric lighting. Mr. Gilpin will sublet contracts for all interior fittings, heating, plumbing, etc.

Fort William, Ont.
Gymnasium to cost $20,000, on Catherine street, for Board of Education. Architect, R. E. Mason. General contractor, C. W. Ward. 2-sty., 40 x 87, solid brick construction, concrete foundation, electric lighting, gravel roofing, steam heating, hardwood flooring.

Medicine Hat, Alta.
Work has started on school to cost $40,000. Architect, W. T. Williams. Contractor, A. T. Burns & Co. 2-sty., 150 x 100, stone foundation, stone and brick construction, hot air heating, electric light, slate roofing, maple flooring, fire escapes.

Montreal, Que.
Library to cost $200,000, 340 St. Denis street, for Seminary of St. Sulpice, 66 Notre Dame west. Architect, Eugene Peyette, 103 St. Francois Xavier street. Gen. contractor, M. Huberdeen, 633 Demontigny street. Ventilating, T. Lessard & Sons Ltd., Craig street east. 65 ft. high, stone and fireproof construction, concrete foundation, steam heating, electric and gas lighting, terra cotta flooring.

St. Catharines, Ont.
Contracts are awarded for alterations to St. George's Anglican Church to cost $10,000 on Church street. Architects, Symons & Rae, Toronto. General contractor, Lincoln Construction Co., St. Catharines. Stone and roughcast construction, steam heating, electric lighting.

Toronto, Ont.
Contract is awarded for school to cost $20,000, Danforth and Carlaw, for Separate School Board, Toronto. Brick, concrete foundation, steam heating, slate roofing, fireproof. Brick and stone, W. H. McIlmurry, 270 Logan avenue. Roofing, Jas. Glynn, 57 Marguerетta street. Carpenter, T. J. Sullivan. Plumbing & heating, P. J. Hayes, 452 Gladstone ave. Plastering, A. Madden, 1139 Dufferin street.

Contract is awarded for library to cost $30,000, Bloor and Lansdowne avenue. Architect, Chapman & McGiffin, 59 Yonge street, Toronto. 1-sty. and basement, slate and metal roofing, steam heating, electric light, structural steel, cut and art stone, terra cotta, stone mantles, reinforced concrete, fireproofing, metal sash and lath, terra cotta facing, plate glass. Excavation, masonry, reinforced concrete, steel and stone contracts let to H. N. Dancy & Son, 220 Howland avenue. Carpentry, Thos. Painter & Son, 333 Huron street. Roofing, A. Matthews, 256 Adelaide street. Plastering, Hoidge & Son, 34 Price st. Paint and glass, A. E. Phillips, 49 Richmond street. Plumbing, Fred Armstrang, 277 Queen W. Electrical, Bennett & Wright, 72 Queen street east.

Winnipeg, Man.
Contract is awarded for stores and moving picture theatre to cost $15,000, for T. Pitblado, Farmers Bldg., Winnipeg. General contractor, Gray & Co., 245 Lendrum street, Winnipeg. Brick and steel construction, brick foundation, steam heating, electric lighting.

Work has started on a moving picture theatre for C. E. Vanderlip, Grain Exchange, Winnipeg. Architect, A. & W. Melville, Builders Exchange, Winnipeg. 2-sty., 50 x 120, brick, stone and steel, steam htg., elec. ltg., felt and gravel rfg., ornamental roofing, maple flooring. Owner is supervising the work which is done by day labor.

Residences

Alliston, Ont.
W. J. Hill, L.D.S., is contemplating the erection of a residence on McDonald street to cost approximately $4,000.

Calgary, Alta.
Plans are ready for residence to cost $4,500, Mount Pleasant avenue, for D. P. McIntyre, 222 5th avenue N. 2-sty., 19 x 36, frame, concrete foundation, electric lighting, shingle roofing, hardwood flooring.

Plans are ready for residence to cost $4,000, Bridgeland avenue, for A. Helderman, 211 7th street east. 2-sty., 22 x 36, concrete foundation, brick veneer construction, hot air heating, electric lighting, shingle roofing, hardwood floors.

Exeter, Ont.
C. Aldsworth will erect a residence to cost $3,200. ½-sty., 30 x 35, brick construction, cement foundation, electric light, shingle roofing.

London, Ont.
Plans are ready for alterations to house to cost $3,000 on Williams street, for J. K. McDermid. New fittings will be required.

Medicine Hat, Alta.
Plans are ready for residence to cost $7,500, Esplanade, for W. J. McLean,

Medicine Hat. Architect, W. T. Williams, Medicine Hat. 2½-sty., brick, tile and stone construction, cement foundation, hot air heating, gas and electric lighting, slate roofing.

Tenders are called for residence to cost $7,999, Esplanade, for H. Stewart. Architect, W. T. Williams. 2½-sty., 40 x 90, frame construction, cement foundation, hot air heating, electric and gas lighting, slate roofing, maple finish.

Mitchell, Ont.

Wm. Hord is preparing plans for the erection of a residence on Montreal st. to cost $4,500. 2-sty., 28 x 45, brick construction, cement foundation, electric light, shingle roofing.

Montreal, Que.

Plans have been prepared for 14 apartments to cost $25,000, S.W. cor. Dorchester and St. Mathieu, for P. R. Du Tremblay, 52 St. James street. Architect, Rene Charbonneau, 15 St. James st. General contractor, O. Lamoureux. 3 sty., 115 x 25, stone and brick construction, concrete foundation, hot water htg., electric and gas light, gravel roofing.

Plans are ready for residence to cost $7,000, Wolseley avenue, for Armstrong & Cook, Confederation Life Bldg., Toronto. Designer and general contractor, E. W. Barnes, 2126 Mance street, Montreal. Brich encased construction, concrete foundation, asbestos and cement roofing.

Montreal West, Que.

C. A. Jones will erect a new residence on Wolseley avenue to cost $8,000. Brick encased construction, concrete foundation, asbestos roofing.

North Bay, Ont.

Tenders are called for residence to cost $5,000, for C. Hammond. Architect, H. W. Angus. 2½-sty., 30 x 40, stone foundation, solid brick construction, hot water heating, electric light, shingle roofing, hardwood floor.

Sackatoon, Sask.

Plans are ready for residence to cost $4,500, avenue E., for A. L. Grant. 2-sty. and attic, concrete foundation, frame construction, water heating, electric light, shingle roofing, oak and fir floor.

Plans are ready for residence to cost $15,000, Avenue road, for R. L. Mitchell, Saskatoon. 1½-sty., concrete foundation, frame construction, electric light, shingle roofing.

Tenders will be called for residence to cost $5,500, 4th avenue, for C. H. Spencer. Architect, Mr. Payton, Saskatoon. 2½-sty., frame construction, concrete foundation, vacuum steam heating, electric light, shingle roofing, oak and fir finish.

Tenders will be called for residence to cost $6,500, 6th avenue, for J. G. Nicholson. Architect, Mr. Payton. 2½-sty., frame construction, concrete foundation, steam heating, electric lighting, B.C. shingles, oak and fir trim.

Toronto, Ont.

Hudson Bros., 202 Jarvis street, architects and builders, are planning to build five detached houses on Hutchison st., to cost $18,000. 2-sty. and attic, brick, hot water heating, electric lighting, tiles, hardwood finish.

Plans are ready for alterations to residence on Spadina road, for A. W. Austin, Spadina road north of Davenport road. Architect, E. G. Bird, Traders Bank Bldg. Extension to hot water heating and electric lighting, hardwood finish, tile work. Tenders received by architect.

Jas. Simpson, 9 North Markham st., will erect a residence to cost $7,500 on High Park Blvd. Architect, Mr. Betson. 2½-sty., brick construction, stone foundation, hot water heating, electric and gas lighting, shingle roofing, hardwood finish and floors. Tenders will be received by owner.

Plans are being prepared for a residence to cost $3,000, for A. Vecchio, 97 Beaver avenue. Architect, J. M. Cowan, 65 Adelaide east. 2-sty., brick veneer, concrete foundation, hot air heating, felt and gravel roofing. Tenders received by owner.

Plans are ready for residence to cost $7,500, Beaumont street, for F. C. Lee, 23 Scott street. Architect is owner. Brick, shingle roofing, hot water heating, gas and electric light, mantles, hardwood finish.

Mrs. E. R. Vaney, 80 Albany avenue, will build one pair semi-detached residences on Sackville street. Architect, F. Tracey, 38 Yonge street arcade. 2-sty., brick, tar and gravel roofing, hot air heating, electric lighting.

Plans are prepared for residence on Balsam avenue, for T. Hartnick, 90 Waverley road. Architect, C. L. Stewart, Stair Bldg. 2-sty and attic, stone foundation, brick construction, hot water heating, electric lighting, shingle roof, oak flooring, birch stains and birch trim down stairs, mantles, stucco ceiling in dining room, leaded glass, laundry tubs.

Tenders are open for apartments to cost $12,000 on Foxbar road, for F. G. Smith, 37 Rose Hill avenue. Owner is builder. 2-sty. and basement, 60 x 35, brick construction, brick foundation, steam heating, electric and gas light, felt and gravel roofing, hardwood floors and trim, mantles, stucco.

Tenders are called for a residence to cost $10,000 on Indian road, for Mr. Mulholland. Architect, H. Simpson, 84 King street E. 2½-sty., 54 x 32, brick, stone foundation, hot water heating, electric lighting, hardwood floors, art glass, laundry tubs. Tenders received by architect; close May 4th.

Plans are prepared for 5 dwellings to cost $12,000, Runnymede road, for Jacobs & Rovin, 156 Maria street. Architect is owner. 2½-sty., brick construction, stone foundation, hot air heating, electric lighting, shingle roofing.

Waterford, Ont.

Plans are ready for residence to cost $3,000 for Dr. Teeters. 1½-sty., 25 x 40, brick construction, shingle roofing.

Geo. Neal will build a residence on South Main street to cost $3,500. 2-sty., 25 x 40, brick construction, cement foundation, electric lighting, shingle roofing.

Winnipeg, Man.

Tenders are called until May [illegible] for the erection of a residence on Spence street, for T. Wilson, Winnipeg. Architect, Paul M. Clemens, 331 Garry street, Winnipeg. 4-sty., 43 x 39, solid brick construction, stone foundation, hot water heating, electric lighting, shingle roofing, hardwood finish throughout.

CONTRACTS AWARDED

Brantford, Ont.

Residence to cost $3,000, Darling ave., for Henry Foulds. General contractor, Arthur O. Escord. 2-sty., 27 x 37½, brick construction, concrete, brick and stone foundation, electric lighting, shingle on asbestos roofing.

Calgary, Alta.

Residence to cost $4,000 on 5th avenue for A. C. Lynch, 326 13th avenue East. General contractor, A. Lambert, 1310 15th avenue west. 2-sty., 19 x 34, frame construction, concrete foundation, hot air heating, electric lighting, shingle roofing, hardwood finish.

Plans are drawn for residence to cost $9,000, South Mt. Royal, for F. C. Manning, Revelstoke Lumber Co. Architect, Burroughs & Richards, Calgary. Owner is contractor. 2½-sty., 40 x 35, brick veneer construction, concrete foundation, electric lighting, steam heating, shingle roofing, hardwood flooring.

Residence to cost $8,000, 4th avenue, for Jos. Stanley. General contractor, J. H. Whittleton, 216 17th avenue west. 2-sty., 30 x 48, brick veneer construction, concrete foundation, electric ltg., shingle roofing, hot water heating, hardwood finish.

Plans are ready for a residence to cost $4,500, on Sixth avenue west, for H. Margolis, Eighth ave. east. General contractor, J. Harrison, Box 1243, Calgary. 2-sty., 20 x 36, frame construction, concrete foundation, electric lighting, steam heating, hardwood flooring, shingle roofing.

Residence to cost $6,000, Elbow Park, for R. A. Pike, Pacific Elevator Co. General contractor, Reliance Investment Co. 2-sty., 36 x 28, concrete foundation, frame construction, hot water heating, electric light, shingle roofing, hardwood flooring.

Residence to cost $4,500, Elbow Park, for J. N. Crawford, Box 455. General contractor, J. A. McPhaie, 1139 6th ave. west. 2-sty., 25 ft. 6 in. x 33 ft., concrete foundation, frame construction, electric light, shingle roofing, hardwood finish.

Dundas, Ont.

J. W. Dickson has started work on the erection of a new residence to cost $12,000. 2-sty., 25 x 40, concrete foundation, cement block construction, shingle roofing, electric lighting, hot air heating.

Fergus, Ont.

Contract is awarded for residence to cost $3,500 for J. Hathaway. Architect is owner. Mason contractor, J. Ashwood, Fergus. 2-sty., brick veneer, stone foundation, electric lighting, shingle roofing, hot air heating.

Maisonneuve, Que.

Work has started on a [illegible] to cost $5,000 on Adam street, for Philias Leonard, St. Leonard de Port Maurice. General contractor, A. Rocalet, 477 Moreau street. 2-sty., 33 x 39, stone construction, concrete foundation, electric lighting, hot water heating, gravel roofing.

Work has started on a [illegible] to cost $6,000 on Adam street, for Alph. Gratton, 138 Third avenue. Architect, C. A. Reeves, 58 St. James street. Contractor is owner. 2-sty., [illegible] x 60, stone foundation, concrete construction, electric and gas lighting, hot water heating, gravel roofing.

Montreal, Que.

Work has started on a residence to cost $6,000. S. De Repentigny, 428 B. Aylevin. Owner and contractor. 3-sty., 50 x 42, stone construction, concrete foundation, gas lighting, gravel roofing.

Contract is awarded for six flats to cost $11,000, St. Hubert street, for E. Rochon, 977 St. Hubert street. Architect, L. R. Mont Briant, 230 St. Andre street. General contractor is owner. Stone masonry work, Corbeil & Frere, 192 Clark street. Three storey, 25 x 40, masonry foundation, brick and stone construction, hot water heating, electric lighting, gravel roofing.

Work has started on nine flats to cost $10,000, Waverly street, for H. Plante & Company, 1807 Labelle street. Contractor is owner. Three-storey, 50 x 65, pressed brick construction, concrete foundation, electric lighting, gravel rfg.

Work has started on flats to cost $10,000, Notre Dame W., for Jos. Dupius, 82 Sir George Etienne, Cartier Park. Contractor is owner. 3-sty., 50 x 55, stone and wood construction, concrete foundation, gas and electric lighting, gravel roofing.

Nine flats to cost $9,000 on Garnier street, for P. T. Charlebois, 1234 St. Hubert street. Owner is contractor. 3-sty., 50 x 34, brick encased construction, concrete foundation, gas and electric lighting, hot air heating, gravel rfg.

Work has started on flats to cost $4,000, on Dorion street. Contractor, Achille Lamontague, 938 A Cartier st. 3-sty., 30 x 54, brick construction, stone foundation, gas and electric lighting, gravel roofing.

Work has started on 3 flats to cost $4,500 on Stadacona street, for Geo. Cardinal, 196 Stadacona street. General contractor, Osias Chauvin, 98 Joliette street. 3-sty., 24 x 36, brick encased construction, concrete and stone foundation, electric lighting, gravel roofing.

Flats to cost $4,000, Delanaudiere st., for Philippe Ferenette, 216 Fabre street. General contractor, Arsene Frenette, 212 Fabre street. 3-sty., 25 x 59, pressed brick construction, stone foundation, gas light, gravel roofing.

Work has started on residence to cost $7,000, St. Jerome street, for Armand Malo, 1821 Bordeaux street. General contractor is owner. 3-sty., 35 x 64, concrete foundation, brick construction, electric light, tar and gravel roofing.

Residence to cost $3,000, Old Orchard avenue, for A. A. Beique, Old Orchard avenue. General contractor, H. Gaffney, 13 St. John street. 2-sty., 25 x 38, brick construction, stone foundation, hot water heating, electric light, tar and gravel roofing.

Work has started on 6 flats to cost $5,000, Cosgrain street, for Denis Magnan, 338 Panet street. Contractor is owner. 3-sty., 36 x 54, pressed brick construction, stone foundation, gas and electric lighting, tar and gravel roofing.

Work has started on 3 flats, to cost $5,000 on Garnier street, for A. Bouthillette, 367 Fabre street. Contractor is owner. 3-sty., 25 x 68, stone foundation, pressed brick construction, gas and electric lighting, hot air heating, gravel roofing.

Plans are ready for dwelling to cost $4,000, Brock street, for W. L. Wright, 415 MacKay street. General contractor, Benott Bros., Montreal West. 2-sty., brick encased construction, stone foundation.

Montreal West, Que.

Work has started on a residence to cost $7,500, Strathearn street, for M. Lombarbe, Montreal West. Architect, Gen. contractor, owner. Painting and glazing, E. B. Bailey, 69 Fairmount ave. E. Plumbing and heating, T. L. Bain, 55 Guy street. Brick encased construction, concrete foundation, electric lighting, asbestos roofing.

Outremount, Que.

Contract is awarded for residence to cost $18,000, on St. Catharines road, for Eugene Desmarias, 287a St. Denis st., Bontreal. Architect, J. A. Godin, 269 St. Denis street. General contractor, Mt. Royal Construction Co., 82 St. James street, Montreal. 4-sty., 39 x 60, stone foundation, terra cotta construction, hot water heating, electric lighting, gravel roofing.

Sherbrooke, Que.

Dwelling to cost $2,500 on Armstrong street, for Theodore Blouin, 1 Blouin Lane. General contractor, Jos. Blouin, 3 Blouin Lane, 2-sty., 33 x 25, wood construction, electric lighting, cement foundation, hot air heating, iron roofing.

Toronto, Ont.

Plans are drawn for residence to cost $3,500, Boston avenue, for J. Kritzer, 450 Logan avenue. Architect, C. H. Knapton, 23 Kenelworth avenue. 2-sty., 50 x 100, brick, stone foundation, hor air heating, electric lighting, shingle roofing.

Plans have been prepared for residence to cost $6,500, 200 Glen road, for Alan M. Stewart, 607 Crawford street. Owner is builder and architect. 2-sty., and attic, 40 x 34, brick construction, brick foundation, hot water heating, electric lighting, shingle roofing, hardwood floors.

Work will start shortly on a residence to cost $5,000 on Edgar avenue, for Jas. Walsh, 37 Adelaide E. Architect, Wm. T. Russell, 2085 Yonge street. Builder is owner. 2½-sty., brick, stone foundation, slate, tar and gravel roofing, hot water heating, electric light, cut stone, 3 mantles, hardwood finish.

Plans are ready for residence to cost $4,000, Marchmont street, for Jas. Delworth, 46 Hampton avenue. Owner is builder and architect. 40 x 84, brick, stone foundation, hot air heating, electric light, tar and gravel roofing.

Plans are prepared for residence to cost $6,250, Playter Boulevard, for G. T. Barry, 100 Victor avenue. Architect, L. Havill, 108 Mail Bldg. Builder, Jas. Davis, 170 Victor avenue. Brick, stone foundation, hot water heating, electric lighting, slate roofing, hardwood floors, oak finish, chipped and leaded glass, mantles, stucco, weeping tiles, structural steel, plate glass.

Plans are drawn for 3 pair dwellings to cost $12,000 on Uxbridge avenue, for Wm. Geo. Russell, 85 Sorauren avenue. Owner is builder. 2-sty., 125 x 33, brick construction, stone foundation, hot air heating, electric lighting, slate roofing.

Plans are ready for 1 pair semi-detached residence to cost $7,000, N.W. cor. Dundas and Lansdowne avenue, for F. G. Smith, 37 Rose Hill avenue. Owner is builder. Architect, P. H. Finney, 43 Victoria street. 2-sty., brick construction, brick foundation, hot air htg., electric light, felt and gravel roofing.

Plans are ready for residence on North side Wright avenue, for D. H. Griffin, 179 Macdonnell avenue. Owner is builder and architect. 2-sty. and attic, stone foundation, brick construction, hot water heating, electric lighting, shingle roofing, hardwood floors.

Plans are ready for a residence to cost $3,000, Laughton avenue. Architect and builder, Wm. H. Hubbard, 231 Wright avenue. 2-sty., brick, stone foundation, hot air heating, electric ltg., felt roofing.

Verdun, Que.

Work has started on a residence to cost $3,000 on Evelvn street for Geo. O. Salberg, 3 Edmond street. Contractor is owner. 2-sty., 25 x 26, concrete foundation, wood encased with concrete construction, gas and electric light, gravel roofing.

Westmount, Que.

Residence to cost $35,000 on Belvedere road, for H. Murray, Victoria ave., Montreal W. Architects, Ross & McFarlane, 1 Belmont street. Contractors, Robertson Bros., Chestnut avenue, (masonry and brick work). Carpenter, A. Strang, 4550 St. Catherine street. Ptg. and glazing, A. J. Wilson, 37 St. Antoine street. Roofing, G. W. Reed & Co. Ltd., 37 St. Antoine street. 2-sty. and attic, 2200 sq. ft. brick and stone construction, masonry foundation, hot water heating, electric and gas lighting, slate roofing.

Winnipeg, Man.

Apartments on Burrows and Salter streets, for H. Hirsh. Architect, Hooper & Hooper, 303 McIntyre Building, Winnipeg. Builder is owner. 3-sty., 62 x 90, stone and brick construction, steam heating, electric lighting, galvanized iron on wood rolls, birch trimming.

Residence on Yale avenue, for J. D. Burnham, 142 Spence street. Architect, B. W. Bellhouse, Canada Bldg., Winnipeg. General contractor, Davidson Bros., Tribune Bldg., Winnipeg. 2½-sty., 36 x 40, stone foundation, frame and timber construction, hot water heating, electric light, shingle roofing, oak flooring.

Contracts are awarded for residence to cost $10,000, on Sherbrooke street, for L. M. Cameron, 148 Sterbrooke st. Builder is owner. 2½-sty., stone foundation, frame, hot water heating, electric lighting, fir and maple flooring.

Contract is awarded for residence to cost $15,000, for A. Reid, 83 Carlton st. Contractor, L. M. Cameron, 149 Sherbrooke street. 2½-sty., frame. stone foundation, electric lighting, steam heating, shingle roofing, fir and maple floors.

Business Buildings and Industrial Plants

Calgary, Alta.
W. J. Gourlay, 614 6th avenue west, will erect a business building 25 x 130, reinforced concrete and. steel to be 6 storeys high. Plans will be prepared shortly.

Plans are being prepared for office building for Calgary Herald Publishing Co. Architect, Brown & Vallance, Montreal and Winnipeg. 10-sty., concrete foundation, brick construction, fireproof throughout, steam heating, electric lighting, felt and gravel roofing, oak trimming.

Hamilton, Ont.
The Heintzman Piano Co., King E., Manager, A. L. Garthwaite, have purchased a three-storey brick building, cor. King and John streets, and will entirely remodel it, putting in new front and fittings.

D. B. Wood, Wood Milling Co., Main street E., have purchased old St. Patrick's school on Hunter street ana purpose remodelling it for warehouse.

Meaford, Ont.
Plans are ready for addition to factory to cost $30,000 for Meaford Mfg. Co. Architect, Manager, Meaford Mfg. Co. 3-sty., 200 x 65, solid concrete foundation and walls, paroid roofing, furniture machinery required.

Medicine Hat, Alta.
Medicine Hat Chalk Company are contemplating the erection of a new factory to cost $25,000. Building will be of brick, stone and concrete construction, and if by-law passes work will start within sixty days.

Plans are in preparation for bank and office building to cost $50,000 on Toronto street for Union Bank of Canada. 3-sty., 25 x 75, brick construction.

Montreal, Que.
The controllers are considering the erection of a work shop and garage, which is advocated by Chief of Fire Department, to cost $100,000.

J. Birchenough, 410 Merchants Bank Bldg., is contemplating the erection of a departmental store on St. Catherine street. Six storeys, 390 x 97.

Muir Kirk, Ont.
W. Bablock, Hamilton, Ont. ,is planning to erect an evaporator plant at a cost of $40,000. For further information apply to W. K. McLean, Highgate.

Niagara Falls, Ont.
The city has passed a by-law to give a new free site for a foundry for E. T. Pollard. Mor information, write Ald. E. D. Pitt.

Ottawa, Ont.
Capital Brewery Co., Mgr., Mr. Kuntz, will erect a new building, Wellington street and Preston 4 or 5 storeys, solid brick, at an approximate cost of $50,000

Point St. Charles, Que.
The Dominion Government, Ottawa Ont., are having plans prepared for post office. Architect, Cox & Amos, 112 Mansfield street, Montreal

Regina, Sask.
Plans are being prepared for office building on 11th avenue, for Canada Life Ins. Co., Montreal. Architect, Brown & Vallance, Montreal, Que., and Regina, Sask. 6-sty., 75 x 90, terra cotta on concrete, reinforced concrete steel construction.

St. Marys, Ont.
R. Caufield, Artificial Stone Co., St. Marys, has recently purchased 1½ acres on which he contemplates erecting a large stone quarrying plant. New equipment will be required throughout. Estimated cost $25,000.

Saskatoon, Sask.
The Saskatoon Tent & Mattress Co. are contemplating the erection of a reinforced concrete factory on Avenue H. to cost $100,000.

Plans are ready for addition to office to cost $5,000, for Lee Bros. Concrete foundation, solid brick construction, electric lighting, steam heating, pitch and gravel roofing.

S. W. Ross is planning to erect stores and offices to cost $150,000. Architect, W. S. Maxwell, Montreal. 7-sty., reinforced concrete, brick, stone trimmings, 3 sets of vaults on each floor and 3 elevators. This report issued March 28th stated that contracts were awarded—Contracts will not be awarded for some time.

Stratford, Ont.
The McDonald Thresher Co. will build a factory extension to cost $50,000. 3-sty., 50 x 120, stone foundation, brick construction, steam heating, electric lighting. Plans will be prepared at once, and new equipment required. By-law carried to grant them certain concessions.

G. L. Griffith's plant at Melbourne was completely destroyed by fire and a by-law has been passed to enable him to move his business to Stratford. Complete new machinery will be required. Estimated cost of new building is $7,000.

Thorold, Ont.
Tenders will be called for pool room and barber shop for D. P. O'Donnell, Front street. 2-sty., 26 x 90, cement construction, concrete foundation, hot water and air heating, electric lighting, brick, cement and flat roof, maple flooring. Mason contractor, Wm. Justice, Thorold.

Toronto, Ont.
Tenders are open for store on Ann street for Mr. Burgess, c/o Burgess Powell, Toronto. Architect, A. J. Rattray, Stair Bldg. 2-sty., brick, stone foundation, hot water heating, electric light, felt roofing, tile entrance, mirrors, maple and oak floors, stucco in store, art and plate glass.

Plans are being prepared for garage to cost $5,000 capable of housing at least 3 auto trucks. Brick, stone foundation, electric lighting. For Dominion Government, Ottawa. Architect, Dominion Government Architects Office, Ottawa.

Walkerville, Ont.
The Merchants Bank have purchased property 100 x 140 and contemplate the erection of a handsome new bank building. Complete new interior fittings will be required, including wire cages, vaults, safes, electric equipment, etc. Estimated cost $20,000.

The Lake Erie Coal Co. intend to enlarge their coal handling capacity, and will instal machinery capable of handling 300,000 tons per annum. Present ice house will be removed, and a larger and more modern house will be equipped.

Waterloo, Ont.
The Globe Furniture Co. are contemplating an addition to their plant, to be used as warerooms. Work will start as soon as possible.

Wingham, Ont.
King Bros., are contemplating the erection of a store to cost $20,000. 2-sty., 30 x 55, brick construction, stone foundation, electric lighting, gravel rfg. Shelving, showcases and general store fittings required.

CONTRACTS AWARDED

Calgary, Alta.
Warehouse to cost $100,000 on 11th avenue for Wood, Vallance & Adams, Calgary. General contractor, McNeil & Tramer, Alexander Co., Calgary. 6-sty., 130 x 50, concrete foundation, brick construction, steam heating, electric ltg., gravel roofing.

Plans are ready for tailoring establishment to cost $4,500, 15th ave., for F. L. Heath, 615 15th ave. W. Gen. contractor, C. E. Gunynn, 504 14th avenue E. 2-sty., 25 x 60, brick veneer and frame construction, concrete foundation, hot air heating, electric lighting, shingle roofing.

The Canadian Stewart Malting Co. have commenced work on their large new works in Manchester sub-division which will be erected at an approximate cost of $200,000.

Galt, Ont.
Contracts are awarded for bank building for Bank of Toronto. Local manager, D. McLennan; general contractor, Thomas Handcock, Guelph; carpenter, Hamill Bros., Galt.; painting and glazing, B. Goodfellow; plumbing and heating, T. Lóckhart; plastering W. Mogg.

Hamilton, Ont.
Alteration to building on Caroline St. between York and Cannon streets, for Canadian Meter Co., 88 Caroline street. Architect, S. McPhie, 2 King street W. Contractor, G. E. Mills, 614 King street east.

Lachine, Que.
Work has started on addition to factory, cost $14,000, St. James and Broadway, for Daly & Morin. General contractor, R. Laberge, 122 Margaret street, Montreal. Two storeys, 215 x 104, solid brick construction, concrete foundation, electric light, hot water heating, gravel roofing.

Meaford, Ont.
[illegible] James Sandel Woollen Mills, Meaford Architect, James Sparting, Meaford; mason, Fres. Oliver, Meaford; carpenter and general contractor, James Sparting Four storeys, 40 x 70, cement foundation, brick construction, electric lighting, tar roofing, hardwood flooring, telephone, [illegible]

(Continued on page [illegible])

Tenders and For Sale Department

To Architects and Engineers

[illegible] puts in a tender must see your [illegible] first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at [illegible] offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

City of Moose Jaw, Sask.

Tenders for Paving

Sealed tenders marked, "Tenders for Paving," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon of Wednesday, **May 15th, 1912**, for the laying of approximately 34,000 square yards of pavement.

Plans, specifications and any further information may be obtained from J. Antonisen, City Engineer.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT
W. F. HEAL
17-19 City Commissioners.

The City of Fort William

Garbage Incinerator

Tenders sealed and endorsed "Tenders for Garbage Incinerator," and addressed to the Chairman of the Works Committee will be received on or before the **15th** day of **May, 1912**, at the office of the City Clerk, for the complete installation, including all buildings, of a fifty (50) ton incinerator plant and the operation of same for a period of three months after completion.

Forms of tender, on which all bids must be submitted, may be obtained from the office of the City Engineer.

A cash deposit of ten per cent. of the cost of the plant will be required, and same will be returned to the contractors on the completion of the three month period of operation.

The lowest or any tender not necessarily accepted.

JOHN WILSON,
City Engineer.
Fort William, April 11, 1912. 16-19

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 382, Winnipeg. 11-23

City Engineer Wanted

Applications will be received by the undersigned up till twelve noon on **Thursday, the ninth** day of **May, 1912**, for the position of City Engineer of North Vancouver.

Applicants to state experience, qualifications and salary expected.

THOMAS SHEPHERD,
City Clerk,
16-19 North Vancouver, B.C.

CITY OF GUELPH

Tenders for Bridge

Tenders will be received by T. J. Moore, City Clerk, up till noon on **Wednesday, May 15th, 1912**, for the construction of a reinforced arch bridge and viaduct for foot traffic on Heffernan street, over the C. P. R. and the River Speed, having a total length of about 520 feet.

Plans and specifications may be seen at the office of the City Engineer, Guelph, or at the offices of the Contract Record and The Canadian Engineer, Toronto, or may be obtained from the City Engineer for the sum of Five Dollars, which will be returned upon return of the plans.

A marked cheque for $400 must accompany each tender.

The lowest or any tender not necessarily accepted.

J. HUTCHEON,
City Engineer.
Guelph, Ont., April 29, 1912. -18

Crushing Plants For Sale

We have on hand ready for immediate delivery, the following used crusher outfits. We will sell crushers alone or with screens and elevators as wanted.

1—No. 10 McCully with screen and elevator, all in good condition.
2—No. 7½ McCully, one fitted with manganese steel head and concaves. One 65 ft. elevator and 48 in. x 16 ft. screen.
1—No. 7½ Gates style K new head concaves and bottom plate.
1—No. 6 McCully with manganese steel head and concaves.
1—No. 6 Austin with manganese steel head and concaves.
4—No. 6 Gates style K with new manganese steel head and concaves.
2—No. 5 Austin crushers, screens and elevators.
2—No. 5 McCullys with manganese steel head and concaves.
1—Each No. 4 Gates, Austin and McCully crushers in good shape.
2—Each No. 3 Austin and McCully crushers. McCullys manganese fitted 3 screens and elevator for No. 3 plants.
1—No. 3 Gates style D with screen and elevator.

Any of these crushers can be inspected or we will furnish report of the Pittsburg Testing Laboratory.

Our spring bulletin gives a large list of used contractors' equipment which we have for sale. Can save you money.

MARSH COMPANY,
Old Colony Building,
Chicago, Ill.

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

Books for Sale

A number of books of interest to engineers and contractors are offered for sale at about one-half their cost. Among them are the following:

Reinforced Concrete, 590 pages, by Albert W. Buel, C.E. Publishers, The Engineering News Publishing Co., New York.

Chemistry and Physics of Building Materials, 350 pages, by Alan E. Munby. Publishers, Constable & Co., London, Eng.

Principles of Reinforced Concrete Construction, 320 pages, by F. E. Turneaure and E. R. Maurer. Publishers, Jno. Wiley & Sons, New York.

Treatise on Masonry Construction, 740 pages, by Ira Osborn Baker. Publishers, Jno. Wiley & Sons, New York.

Baldwin on Heating for Buildings, Revised 16th Edition, 400 pages, by Wm. J. Baldwin. Publishers, Jno. Wiley & Sons, New York.

Cement Laboratory Manual, 120 pages, by L. A. Waterbury. Publishers, Jno. Wiley & Sons, New York.

Light and Heavy Timber Framing Made Easy, 395 pages, by Fred T. Hodgson. Publishers, Frederick J. Drake & Co., Chicago.

Practical Concrete Block-making, 75 pages, by Chas. Pallister. Publishers, Industrial Publication Co., New York.

Short Cuts in Carpentry, 90 pages, by Albert Fair. Publishers, Industrial Publication Co., New York.

Estimating Frame and Brick Houses, Factories and Outbuildings, 250 pages, by Fred T. Hodgson. Publishers, David Williams Company, New York.

Sanitation and Sanitary Engineering, 175 pages, by Wm. Paul Gerhard.

Structural Details or Elements of Design in Heavy Framing, 370 pages, by Henry S. Jacoby. Publishers, Jno. Wiley & Sons, New York.

Architectural Composition, 234 pages, by Jno. Beverley Robinson. Publishers, D. Van Nostrand Co., New York.

Guide to Sanitary Inspection, 230 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New York.

Building Construction and Superintendence, 960 pages, by F. E. Kidder, revised by Thos. Nolan. Publisher, W. T. Comstock, New York.

The Water Supply, Sewerage and Plumbing of Modern City Buildings, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New Pork.

Modern Baths and Bath Houses, First Edition, 310 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New York.

Resistance of Materials, 650 pages, by N. de Tedasco and A. Maurel.

Modern Homes, 240 pages, by T. Raffles Davidson. Publishers, Geo. Bell & Sons, London, Eng.

The above books, together with a number of others, may be seen at the office of the Contract Record, 220 King street west, Toronto. Further particulars of any book furnished on request.

Department of Railways and Canals, Canada

Saulte Ste. Marie Canal

Notice to Contractors

Extension of Time

Notice is hereby given that the time for receiving tenders for widening the Lower Entrance Channel-way, Sault Ste. Marie Canal, advertised to be in on Friday the 10th May, 1912, is extended to 16 o'clock on Monday the 20th of May.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 29th April, 1912.

Newspapers inserting this advertisement without authority from the Department will not be [illegible] 19-20

CITY OF SASKATOON

Garbage Incinerator

Sealed tenders, addressed to the City Commissioners, Saskatoon, and endorsed "Tender for Incinerator Plant," will be received up to twelve o'clock noon on Tuesday, **the 25th day of June, 1912**, for the complete installation (including all buildings) of a 70-ton per 24 hours Incinerator Plant, and the operation of same for a period of three months after completion.

Contractors will tender on their own plans and specifications, and tenders must be accompanied by a marked cheque for five per cent. of amount of tender, which will be returned on the expiration of the three months operating period.

Cheques of unsuccessful bidders will be returned within two weeks of awarding of contract.

The lowest or any tender not necessarily accepted.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
[illegible], April 26th, 1912. 19-21

Department of Public Works, Ontario

To Contractors

[illegible] addressed to the undersigned will be received at [illegible] Wednesday, the 22nd of **May**, for the erection of a Lock-up at South Porcupine. Plans and specifications can be seen [illegible] South Porcupine, and at this Department.

An accepted bank cheque payable to the order of the Hon. J. O. Reaume, Minister of Public Works for five per cent. of the amount of the tender and the bona fide signatures and ad[illegible] accompany each tender.

[illegible]

H. F. McNAUGHTEN,
Secretary Public Works Department,
Department of Public Works, Ontario.
Toronto, May 1, 1912.

Newspapers publishing this advertisement without authority will not be paid for it. 19

Township of Wellesley

Tenders Wanted

Sealed tenders marked "Tenders for Drainage Work," addressed to A. B. Robertson, Reeve, Wellesley P. O., Ont., will be received up to **2 o'clock p.m., Thursday, the 30th day of May, 1912**, for the construction of the J. H. Campbell Municipal Drain in the Eastern Section of the Township of Wellesley, in the County of Waterloo, Ont. The said tenders will be opened and considered at Crosshill, at 2 o'clock p.m., Thursday, May the 30th, 1912.

The lowest or any tender not necessarily accepted.

Tenderers must enclose cash $50 or marked cheque to that amount to insure good faith on the part of the contractors.

PETER F. SCHUMMER,
Township Clerk.
St. Clements, Ont., Apr. 30, 1912. 19-20

To Contractors and Excavators

Clean earth can be dumped in the vacant lots on the west side of Clendenning avenue, opposite the Annette Street School. For particulars apply to the Superintendent of Buildings, Board of Education, City Hall, Toronto.

W. C. WILKINSON,
19 Secretary-Treasurer.

Bridge Tenders

Sealed tenders will be received up to noon on Tuesday, May 21, by R. J. Shiel, Mount Forest, for the following bridge work for the Counties of Grey and Wellington.

(a) Retaining walls for Mount Forest bridge.
(b) Concrete Abutment for Scott's Bridge.
(c) Moore's 35-ft. Concrete Girder Bridge.
(d) O'Dwyers 75-ft. Steel Bridge and concrete abutments.

For plans and specifications and other information, apply to R. J. Shiel, Mount Forest, Ont., or to the Engineers.

H. GRAEF, Warden, Wellington County.
J. L. CARTER, Guelph, Ont.
J. W. SUTTON, Ospringe, Ont.
J. JOHNSTON, Warden, Grey County.
MR. WEIR, Durham, Ont.
BOWMAN & CONNOR, Engineers,
19-20 36 Toronto St., Toronto, Ont.

City of Sault Ste Marie, Ontario

TENDERS

[illegible] "Tender for Cement Walks" addressed to W. H. Munro, Mayor, Sault Ste. Marie, Ont., will [illegible] p.m. on **Monday, May 27th, 1912**, for the con[illegible] feet of concrete curbing.

Specifications and plans may be seen and all information and forms of tender obtained, at the office of the City Engineer, Sault Ste. [illegible]

A marked cheque for $1,500, payable to the order of the City Treasurer must accompany each tender. A bond to the amount of $5,000 or in lieu thereof a cash deposit of 10 per cent. of the amount of the tender will be required of the successful bidder.

The lowest or any tender not necessarily accepted.

C. J. PIM, City Clerk.
19-20 W. W. VAN EVERY, City Engineer.

County of Waterloo

Bridge Tenders

Tenders will be received by the County of Waterloo until **May 15th next** for an addition to bridge over Grand River at Blair:—

(a) Two steel spans, 100 ft. each.
(b) Concrete abutment, pier, etc.

For specifications apply to
BOWMAN & CONNOR, C. E.,
19 Berlin, Ont.

CITY OF SHERBROOKE

Sealed tenders, endorsed on envelope, "Tender for Paving," will be received by the undersigned up to three of the clock, afternoon of **Friday, the 17th day of May, 1912**, for paving the following streets:

Wellington street, from Dufferin Bridge to South side of King street, about 8,900 yards.

King street, from Wellington street to Aylmer Bridge, containing about 6,200 yards.

Bridge street, from Aylmer Bridge to East side of Bowen avenue, containing about 2,000 yd.

Depot street, from King street to Grand Trunk Station, containing about 1,100 yards.

Tenders will be received for Natural, Lake, Sheet, Asphalt or Bitulithic.

Further instructions as to specifications and forms of tender can be obtained from Thos. Tremblay, City Engineer, Sherbrooke, Que.

A marked cheque for 10 per cent. of the estimated amount of contract must accompany each tender.

The lowest or any tender not necessarily accepted.

F. J. GRIFFITH, Secretary-Treas.
Sherbrooke, Que., April, 1912. 19-20

City of Sault Ste Marie, Ontario

TENDERS

Sealed tenders fully endorsed and marked "Tender for Sewerage Works," addressed to W. H. Munro, Mayor, Sault Ste. Marie, Ontario, will be received by the City Clerk up to seven o'clock p.m. on **Monday, May 27th, 1912**, for supplying and laying about 21,000 lineal feet of tile sewer pipe with appurtenances.

Specifications and plans may be seen, and all information and forms of tender obtained, at the office of the City Engineer, Sault Ste. Marie, Ontario.

A marked cheque for 5 per cent. of the amount of the tender payable to the order of the City Treasurer, must accompany each tender. A bond to the amount of $5,000 or in lieu thereof a cash deposit of 10 per cent. of the amount of the tender will be required of the successful bidder.

The lowest or any tender not necessarily accepted.

C. J. PIM, City Clerk.
19-20 W. W. VAN EVERY, City Engineer.

CITY OF SHERBROOKE

Granolithic Sidewalks

[illegible] will be received up to noon of **Friday, the 17th** [illegible]

[illegible] der, and Bond will be required of the successful bidder.

The lowest or any tender not necessarily [illegible]

[illegible] Thos. Tremblay, City Engineer, Sherbrooke, [illegible]

F. G. GRIFFITH,
[illegible]

TENDERS

For reconstruction of Bridge near Port Elgin

[illegible] addressed to Dennis [illegible] will be received up till [illegible] Wednesday, May 15th 1912, for the [illegible]

Reconstruction of [illegible] Bridge [illegible]

Construction of one concrete pier.

[illegible] of the [illegible] of the [illegible] each tender, [illegible] if the tender is [illegible] acceptance [illegible]

[illegible] and specifications can be seen at the [illegible] of R. McDowall, Owen Sound, and at [illegible], Port Elgin.

[illegible] accepted.

R. McDOWALL, C. E.,
Consulting Engineer.

[illegible] May 1, 1912. 19

Situations Vacant

[illegible] wanted by manu[illegible] must have had three years' experience [illegible]t's office. Apply, giving age, references [illegible] to Box 490, Contract [illegible] 19

Business Buildings and Industrial Plants

(Continued from page 69)

ers, engine, factory and mill machinery, elevator.

Meaford, Ont.

Canning factory, cost $30,000, for Meaford Canning Co. Architect, F. H. Finley, Meaford; general contractor, Fox Bros., Meaford. Two storeys, 75 x 75, reinforced concrete foundation, brick construction, electric light, gravel roofing, fruit crushing machinery required.

Medicine Hat, Alta.

Work has started on addition to machine shop, cost $5,000, on Factory St., for Alberta Foundry & Machinery Co., Medicine Hat. One storey, 40 x 100, iron clad construction, cement foundation, gas lighting, shingle roofing.

Montreal, Que.

Plans are being prepared for office building, cost $90,000, Bleury street, for Belgo-Canadian Real Estate Co., Transportation Bldg., Montreal. Architects, Finley & Spence, Beaver Hall Hill, Mtl. General contractor, P. Lyall & Sons Construction Co., Transportation Bldg., Montreal. Eight storeys, 40 x 166, mushroom reinforced concrete construction, concrete foundation, tar and gravel roofing, electric and gas lighting, marble finish. Elevators, wired glass, architectural iron.

Contracts are awarded for remodelling Standard Life Bldg., cost $50,000. Architects, MacVicar & Heriot, 104 Union avenue. General contractors, Byers & Anglin, 65 Victoria street. Required, new passenger elevators, staircases, marble finish for hallways and minor fittings.

Warehouse, cost $14,000, on Notre Dame street east, for McColl Bros., Don Esplanade, Toronto. General contractors, Byers & Anglin, 65 Victoria street, Montreal. Warehouse to be 18 ft. high, 83 x 100 ft., rubble masonry foundation, brick front with concrete floors, mill construction, hot water heating, electric lighting, tar and gravel rfg.

Contract is awarded for packing house, cost $60,000, on Bank of Lachine Canal, for Canada Sugar Refining Co., 81 St. Peter street, Montreal. Contractor, E. G. M. Cape, Beardmore Building, Montreal. Contractor for iron work, Dominion Bridge Co., Lachine, Que. Seven storeys, 63 x 91, brick construction, concrete foundation, hot air heating, electric and gas lighting, tar and gravel roofing, iron stairs, metal windows, fire doors, sprinkler system, stand-pipe and hose, concrete floors, reinforced steel construction.

Warehouse on Prince street, for Darling Bros., 120 Prince street. Architects, Brown & Vallance, St. James St., Montreal. General contractor, Atlas Construction Co., 745 St. Catherine St., Montreal. Building to be of reinforced construction.

Work has started on store, cost $3,000, 658 Mount Royal ave., for Vitora Lakait, 235 Dufferin street. General contractor, J. C. Lanoie, 164 Boyer St. Two storeys, 25 x 40, concrete foundation, brick construction, electric light, gravel roofing.

Work has started on store and residence, cost $5,000, Windsor street, for A. Deslauriers, 74 Windsor street. General contractor is owner. Excavation work, F. Belanger, 84 Windsor street. Two storeys, 26 x 40, brick construction, concrete foundation, electric lighting, gravel roofing.

Plans are ready for eight stores and residences, cost $20,000, Fairmount & Park Aves., for M. Tannebaum, 111 Metcalf street. Architect, D. J. Crighton, Jacob Bldg., Montreal. General contractor, D. F. Sheehy, 196 Dorchester street. 152 x 90, brick encased construction, concrete foundation, gas and electric lighting, gravel roofing, hot water heating.

Store and house, cost $7,500, 702 Mt. Royal, for A. Bastien, Ormstown, Que., General contractor, Eugene Des Ormeau, 180 Lagauchetiere east. Three storeys, 30 x 50, pressed brick construction, stone foundation, hot water heating, gas light, gravel roofing.

Work has started on alterations to store, $4,200, at 407 St. Catherine street, for Standard Realties Ltd., 207 St. James street. Architect, House of Browne, Ltd., Montreal. General contractor, John Kennedy, 141 St. Peter St. Two storeys and basement, 22 x 73, brick construction, concrete foundation, electric lighting, hot water heating, gravel roofing. The above owners are extending basement and ground floor to level.

Garage, cost $4,980, Peel street, for J. K. L. Ross, Peel street, Montreal. Architect, E. & W. S. Maxwell, 6 Beaver Hall Square, Montreal. General contractor, Jno. Stewart & Co., 1 Bethune street, Montreal. One storey, 26 x 44, stone construction, concrete foundation, electric light, tar and gravel roofing.

Plans are ready for sash and door factory, cost $8,000, St. Timothee street, for Benoit Fils, 409 St. Lawrence Blvd. Contractor is owner. Three storeys, 88 x 72, brick encased construction, concrete foundation, gas lighting, gravel roofing.

Redcliff, Alta.

Contract is awarded for iron works, cost $8,000, for Alberta-American Ornamental Iron Works, Redcliff, Alta. General contractor, Lussier Construction Company, Medicine Hat, Alta. One storey, 45 x 112, brick construction, gas light, cement foundation, metal roofing.

Shoal Lake, Man.

Hotel for M. Dines, Nugget Hotel. Architect, M. Blankstein, 450 Dufferin avenue. General contractor, Alex. Black, Cobourg & Counter streets, Winnipeg. Three storeys, brick veneer, hot air heating, shingle roofing, electric lighting, fir flooring.

Sherbrooke, Que.

Alteration to store, cost $5,000, Wellington street, for Echenberg Bros. General contractor, Sherbrooke Construction Co. Three storeys, brick encased construction, electric lighting, hot air heating, gravel roofing.

Strathroy, Ont.

Work has started on the erection of a canning factory for Strathroy Canning Co. Superintendent, E. E. Ball. General contractor, Geo. McBeth, Strathroy. Three storeys, 85 x 60. Interior machinery and equipment required.

Toronto, Ont.

Plans are prepared for warehouse, cost $14,000, Brittain street, for F. R. Cowan in trust. Architect, owner. Builder, Thos. Essery, Elliot House. Brick construction, felt and gravel roofing, structural steel, skylights, maple floors, fire doors, metal sash, freight elevators.

Work has started on shops, Shaw St., for McGregor & McIntyre, 67 Pearl St. Architects, Harkness & Oxley, Confederation Life Bldg. Steel and concrete construction, electric lighting. Owners are doing most of the work from their own shops.

Verdun, Que.

Store and residence, cost $3,500, for W. R. Hadley, 293 McDonald street. Contractor, A. G. Collett, 202 Chateauguay. Two storeys, 25 x 53, concrete foundation, solid brick construction, gas and electric light, gravel roofing.

Welland, Ont.

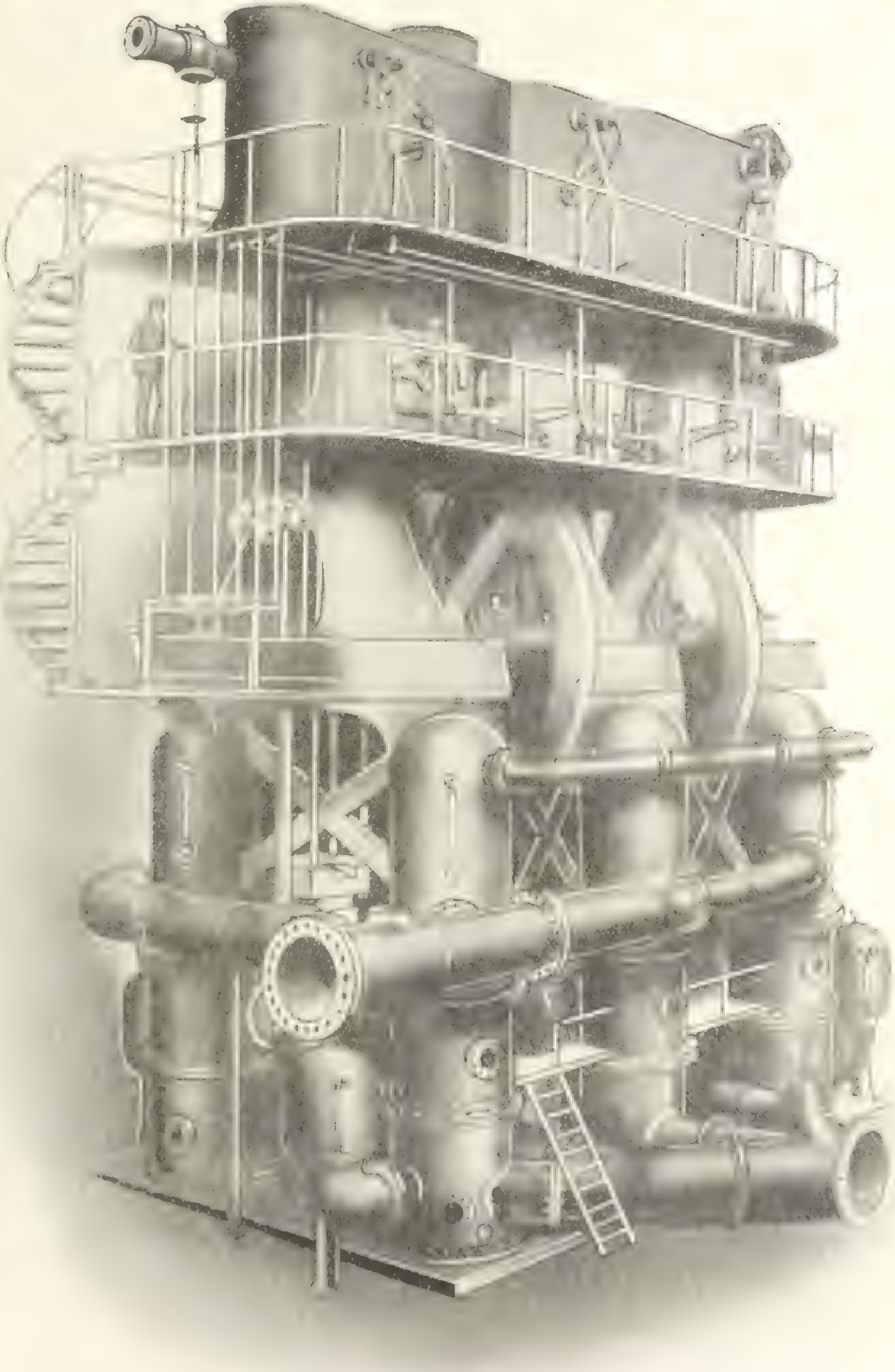
Plans are ready for alterations and extensions to hotel on Division and Muir streets, for Garrett Roach, Welland. General contractor, Builders' Lumber & Supply Co. Two storeys, brick veneer construction, tar and gravel roofing, hotel fittings and furniture, bathroom and toilet fixtures, lighting, ventilating, heating.

Power Plants, Electricity and Telephones

Vernon, B.C.

Tenders will be received by Clerk until 15 o'clock, May 10th, 1912, for the supply and erection of the following electrical apparatus: one 200 b.h.p., 257 r.p.m. Diesel oil engine for direct connection to a 125 kw., 3-phase, 60 cycle a.c. generator with exciter engine. Must be complete with indicator, all tools and

PUMPING ENGINES



PUMPING ENGINE SUPPLIED TO THE CITY OF TORONTO

Reliability is the strongest feature of "INGLIS" steam and motor driven pumps. Superior design, highest quality of material and workmanship, supplemented by rigid tests before leaving our shops, guarantee reliable performance in service. Fifty two years experience stands behind every Inglis Pump.

The JOHN INGLIS COMPANY, LIMITED

14 Strachan Avenue
TORONTO

spare parts. Plans and specifications may be seen at the office of the McLean Daily Reports, King street west, Toronto, on and after April 29th, 1912.

Dorchester, Que.
The Dorchester Electric Co., General Manager, W. T. Wilson, Quebec, require two 1,000 kw. turbo generators, boiler and switchboard specifications being prepared; transformers, arc and incandescent lamps will be called for later. Tenders will be received by the General Manager until May 15th, 1912.

Toronto, Ont.
Plans are ready for building on Lee avenue to cost $3,000, for The Bell Telephone Co., Toronto. Architect, W. J. Carmichael, Bell Telephone Co., Montreal. One storey and basement, 30 x 30, concrete and brick, concrete foundation, hot water heating, electric light, slate roofing, fir doors, metal lath, extension of present sprinkler system. Tenders received by Mr. Cameron, Bell Telephone Bldg., Temperance street.

Weyburn, Sask.
The town is planning five miles of electric extensions for light and power with necessary poles and arc lamps. Three miles of sewers. Four miles of water mains with 150 connections; 40 hydrants.

Miscellaneous

Hamilton, Ont.
The Queen City Oil Co. will make addition to plant here at an estimated cost of $5,000. President, E. Healey, 230 Herkimer street.

The Buffalo Brake Beam Co., Buffalo, N.Y., are negotiating for a site in Hamilton and expect to erect plant at a cost of $200,000. Write W. M. Currie, 13 Freeman Place, Hamilton.

Montreal, Que.
Plans have been prepared for the erection of six flats, cost $10,000, for Mrs. Brossard, 253 St. Joseph Boulevard. Three storeys, 23 x 66, pressed brick constr., stone fndn., electric lighting, hot water heating, gravel roofing.

Ottawa, Ont.
Plans are ready for three residences, cost $11,000, on Osgoode street, for S. Coplan, 282 Murray. Contractor is owner. 71 x 45, and 35 x 45, brick veneer construction, concrete foundation, electric lighting, hot air heating, gravel roofing.

Saskatoon, Sask.
The Great West Saddlery Co., Saskatoon, have plans prepared by Architect J. H. G. Russell, Winnipeg, Man., for the erection of a warehouse on First ave., six storeys, mill construction, stone and stone trim, concrete foundation, steam heating, pitch and gravel roofing, electric lights, maple floors, fir finish. Cost $60,000.

Tenders will be called for the erection of a church, cost $25,000, on Tenth St., for St. James Anglican congregation. Architects, Thompson, Daniels & Colthurst, Saskatoon. Brick construction, concrete foundation, electric lighting, steam heating, shingle roofing, fir finish.

Sault Ste. Marie, Ont.
Tenders will be received by City Clerk addressed to the Mayor until nineteen o'clock Monday, May 27th, for the construction of 169,000 square feet of cement concrete sidewalks and about 21,000 lineal feet of concrete curbing. Specifications and forms of tender may be had at the office of City Engineer. A marked cheque for $1,500 must accompany each and be made payable to the City Treasurer. A bond to the amount of $5,000 or in lieu thereof a cash deposit of 10 per cent. of the amount of tender will be required of the successful bidders. Lowest or any tender not necessarily accepted. City Clerk, C. J. Pim; Mayor, C. W. Munro; City Engineer, W. W. VanEvery.

Transcona, Man.
Work will start as soon as plans are ready on the erection of a large foundry and plant for The Winnipeg Bridge & Iron Works, Winnipeg, Man.

Sherbrooke, Que.
The Sherbrooke Real Estate Co. are contemplating extensions to waterworks in Belleview Park at a cost of $10,000. President, Thos. M. Craig; Engineer, Thos. Tremblay, Sherbrooke. Work to be done by day labor under supervision of city officials.

Toronto, Ont.
The contract for the eleven concrete bridges in the Township of East Whitby was awarded to L. J. Looby, of Dublin, for $13,150. This is at the rate of $6.90 per cu. yd. for the concrete work. Eighteen tenders were received varying from $12,725 to $20,300. Of these, six were under $14,000.

The contract for the 110 ft. steel bridge near New Hamburg was awarded to the Hamilton Bridge Works for $2,998. There was only $100 difference in price for the Class A and Class B bridges. There were eight tenders, the highest being $3,925. The contract for the abutments was awarded to A. Fraser at $5.35 per cu. yd. for the concrete.

Vancouver, B.C.
Plans are ready for an office building, cost $110,000, on Hastings street, for McDougal & Cameron, Seattle. Architect, W. D. Vansiclen, Canada Life Bldg. Eight storeys, 50 x 120, reinforced concrete. Tenders will be called for by architect about May 10th.

Contract is awarded for erection of a garage, cost $75,000, on Thurlow and Alberni streets, for Beggs Automobile Co., Ltd. Architect, L. E. Gordon. Contractor, Dominion Construction Supply Co., Canada Life Bldg. Five storeys, 66 x 132, reinforced concrete fireproof. Building will contain garage, machine shop, sales room, storage rooms, gas tanks, etc.

Contracts are awarded for apartments, cost $45,000, on Powell street, for Mr. Sanguinetti. Contractor, E. J. Ryan, 768 Granville street. Three storeys, 50 x 122, brick and mill construction. Tenders received for sub-work for excavating, brickwork, plastering, electrical wiring, roofing, plumbing and heating.

Architect W. C. F. Gillman, Hutchinson Building, is preparing plans and will call for tenders for the erection of a three-storey store and apartments building, on Robson street, to cost $10,000.

Walkerton, Ont.
Tenders will shortly be called for the digging of a canal for the deviation of the Sauble River between the Townships of Sullivan and Arran. Plans will soon be prepared.

Winnipeg, Man.
Tenders will be received by the Board of Control until May 15th, 1912, for an electrical locomotive and electric shovel stone crushing equipment, cost $14,000, to be used at Bird's Hill Gravel Pit. Plans and specifications may be seen at the office of the Chief Engineer. Lowest or any tender not necessarily accepted. Engineer, C. P. Kelpin, Stony Mountain, Man. Chief Engineer, J. G. Glassco, 54 King street, Winnipeg.

New Companies

The Ontario Realty and Security Co., Ltd., has been incorporated with a capital of $100,000, to carry on a general land and building business with head office at Brantford. The provisional directors are, D. G. Husband, Geo. Harris and S. G. Read, all of Brantford.

The Union Electric and Contracting Co., Ltd., has been incorporated with a capital of $150,000, to carry on a general electric and electric railway supply business with head office at Toronto, the provisional directors are A. Moore, C. A. Lewis and H. C. French, all of Toronto.

The Chambly Realty Company, Limited, has been incorporated with a capital of $250,000, to construct and operate tramways, roads, bridges, etc., to develop water powers and other powers for the development of electricity or other motive power. The head office is at Montreal, and the incorporators are L. Shlakman, Moses Goldberg and Harry Hershman, all of Montreal.

The Dominion Properties, Limited, have been incorporated with a capital stock of $50,000. to generate, manufacture steam, heat, gas, compressed air, electricity, etc., for the supply of light, heat and power. The head office is at Montreal and the incorporators are D. W. Campbell, A. Kelly and W. J. Dresser, all of Montreal.

City Estates, Limited, have been incorporated with a capital of $100,000, to erect buildings and deal in all kinds of building materials, the head office is at Montreal and the incorporators are Wm. Geraghty, C. W. Baker and H. C. Bartleet, of Montreal.

Standard Lime Co., Ltd., has been incorporated with a capital stock of $75,000, to manufacture and deal in lime, bricks, cement and other building materials, with head office at Joliette. The incorporators are L. N. Dupuis, Jos. E. Theriault, of Montreal, and E. E. Lepine of Joliette.

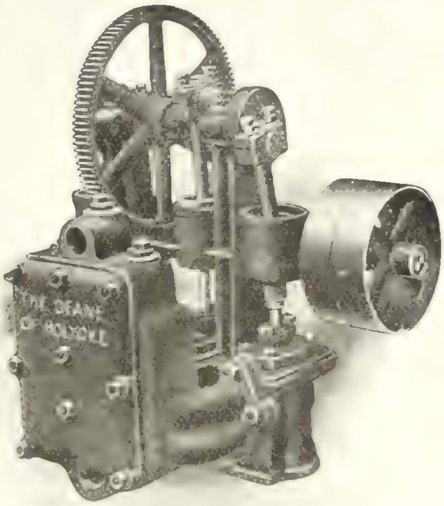
Texas Northern Land and Irrigation Company, Limited, has been incorporated with a capital stock of $10,000,000 to acquire and hold timber lands, sink wells and construct waterworks, reservoirs and develop powers for electric lighting and other purposes. The head office is at Toronto, and the incorporators are Robt. Gowans, J. S. Lovell and Wm. Bain, all of Toronto.

The Viaduct Realty Company, Limited, has been incorporated with a capital of $40,000, to carry on a general land and building business with head office at Toronto. The provisional directors are J. E. Maclean, G. A. Merrick and J. E. Maclean, all of Toronto.

Deane Power Pumps

ADMIRABLY ADOPTED FOR

House Supply
Boiler Feeding
Tank Service



FOR PRICES INQUIRE OF

THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO. Limited
WORKS: WILLIAM and SEIGNEURS STREETS, MONTREAL
Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

Ambursen Hydraulic Construction Co. of Canada, Limited
Concrete-Steel Dams, Bulkheads, Flumes, Transmission Lines, Power Houses and General Hydraulic Construction
405 Dorchester Street West - - - MONTREAL

WATER PURIFICATION

¶ This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
305 KENT BUILDING, TORONTO

FILE YOUR PLANS

Free of charge at any of the four offices of the

"CONTRACT RECORD"

AND ENGINEERING REVIEW

Contractors and manufacturers of building, municipal, railway, and power plant equipment not only expect to see your tenders advertised in the "Tenders' Department" of the "Contract Record," but they will also find it a great convenience if you place your plans and specifications on file at any or all of our four offices, viz. Toronto, Montreal, Winnipeg and Vancouver.

Send along your next Tender Advt. together with Plans and Specifications

CONTRACT RECORD

AND ENGINEERING REVIEW
220 King St. West, TORONTO

MONTREAL
Board of Trade Building

WINNIPEG
Travellers Building

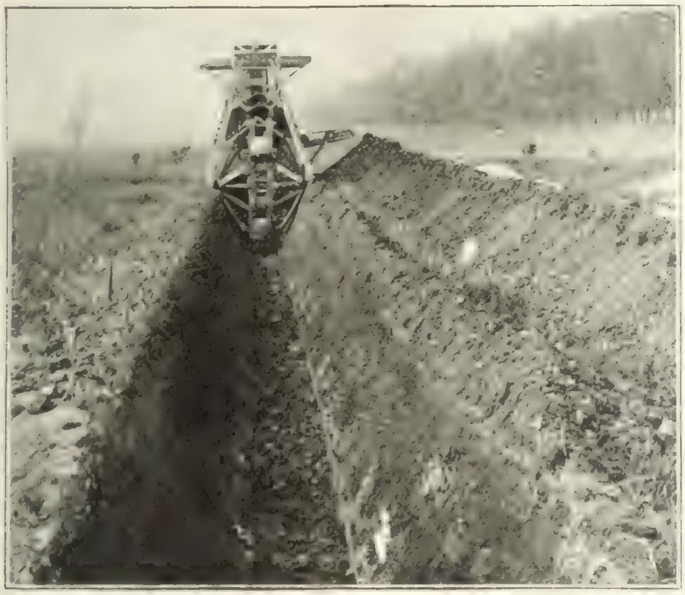
VANCOUVER
Hutchison Block

One Outfit Digs Tile Ditches and Open Ditches

If The Outfit Is An

AUSTIN TRENCH EXCAVATOR

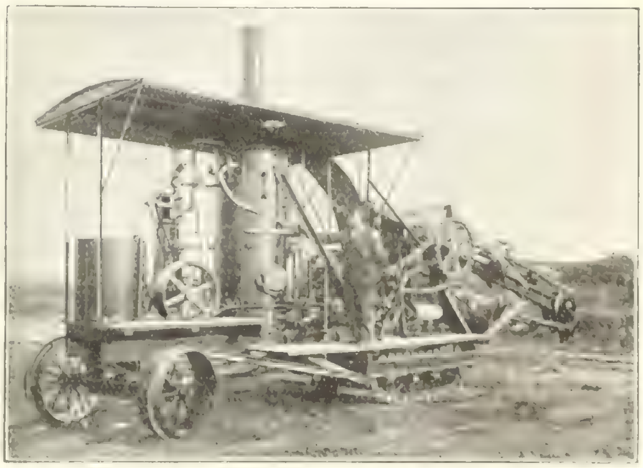
with Bank Sloping Attachment



By a simple change the excavator which will dig a tile ditch or sewer trench with vertical sides, becomes an excavator for digging open ditches with sloping sides.

A ditch with sloped banks is distinctly superior to one with ragged sides; it is less liable to scour and to formation of bars; its banks do not cave into the channel; it costs less to maintain; it is more presentable; it carries more water per unit of earth removed.

The Austin Trench Machine with Bank Sloping Attachment is independent of conditions. Its all steel construction, with manganese steel working parts, equips it for trenching any material except solid rock. Its positively self-cleaning buckets equip it to dig, without clogging, the stickiest clay and gumbo. Its multipedal rolling platform tractions prevent it from miring in any ground over which a wagon can be driven.



It travels over country roads by its own power 1-½ miles an hour. **It digs sloping bank ditches at a maximum rate of 9 lin. ft. per minute.** The spoil is deposited on either side of the ditch. Motive power steam or gasoline.

We specialize in ditching machinery for open ditches and pipe line work. These various machines are known to contractors as the "AUSTIN LINE," manufactured by the F. C. Austin Drainage Excavator Co., and comprise the following:

- Drainage Excavator - Type A
- Drainage Excavator - Type B
- Levee Builder
- Drag Line Excavator
- Drainage Excavator - Type R
- Side Hill Ditcher
- Highway Ditcher
- Orange Peel Ditcher
- Pipe Line Excavator
- Special Wheel Ditcher
- Farm Tile Ditcher

AUSTIN SEWER AND WATERWORKS EXCAVATOR

AUSTIN COMBINATION SLOPING BANK or VERTICAL BANK EXCAVATOR

Ask for Catalogue No. 208.

F. C. Austin Drainage Excavator Co.

Railway Exchange, CHICAGO, ILL. U.S.A.

Represented in Eastern Canada By Lecky & Collis, Napanee, Ontario
Western Canadian Agents, Canadian Equipment & Supply Co., Vancouver and Calgary

AGENTS WANTED IN OPEN TERRITORY

Marble and Onyx

Our new modern saw and finishing mill at Bridgeburg, Ont., will be in full operation by May 15th and we are prepared to take contracts for delivery any time after June 1st. We will carry in stock and handle all of the high grade Italian, French, German, Greek, Belgian, African, Swedish, and other foreign marbles, as well as those of Canada and the United States.

Among the many jobs we have already done in Canada are:

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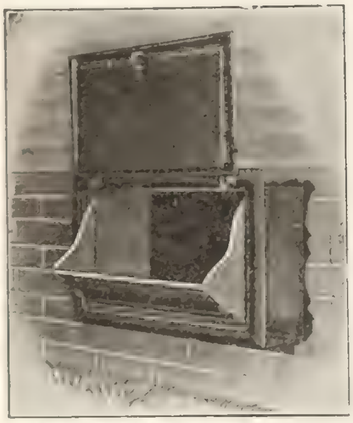

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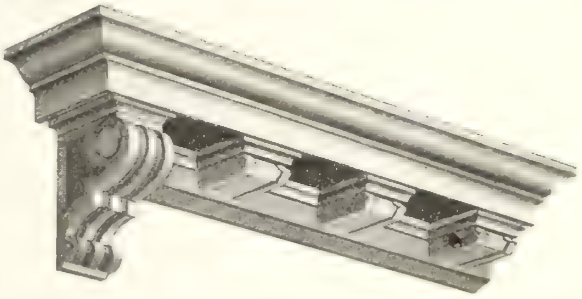

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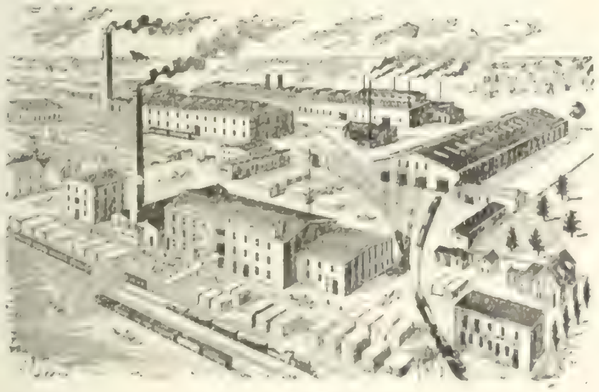

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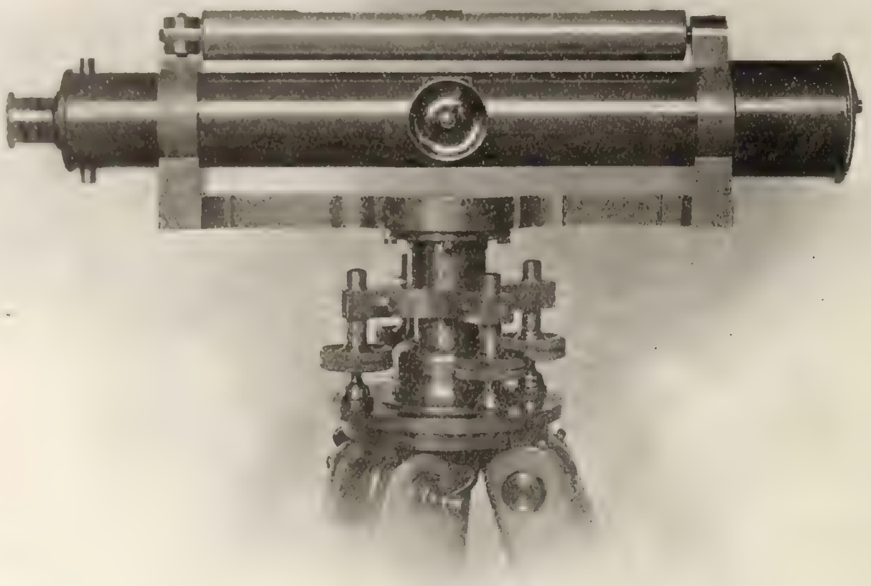

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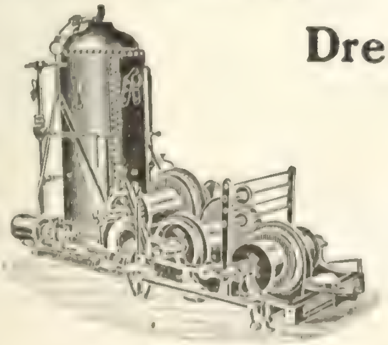

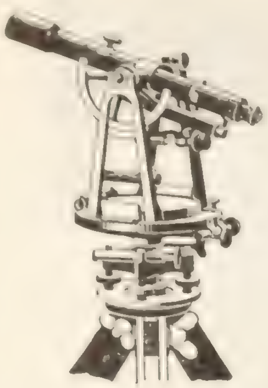

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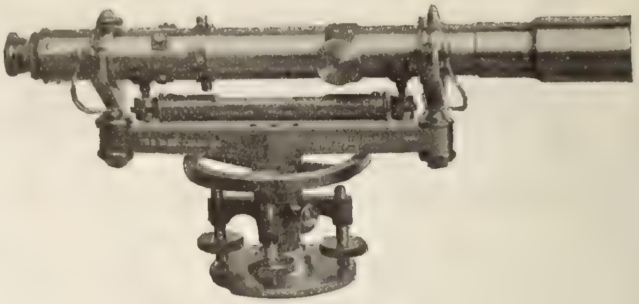

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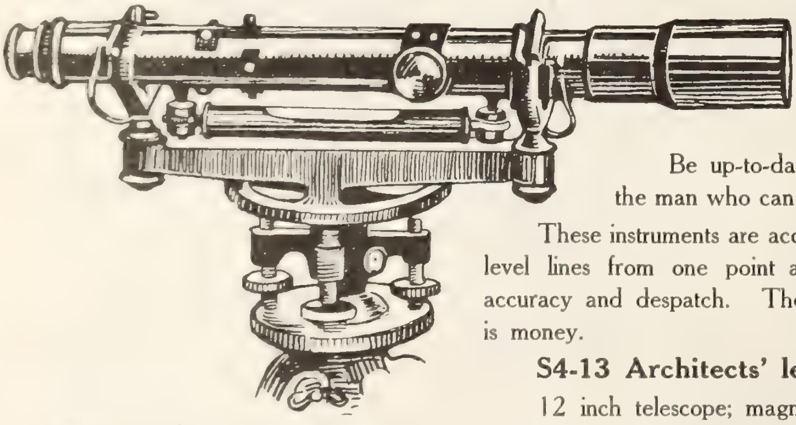

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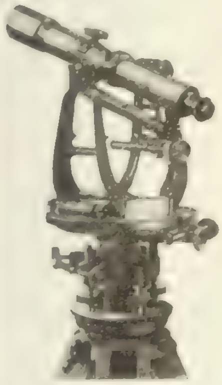

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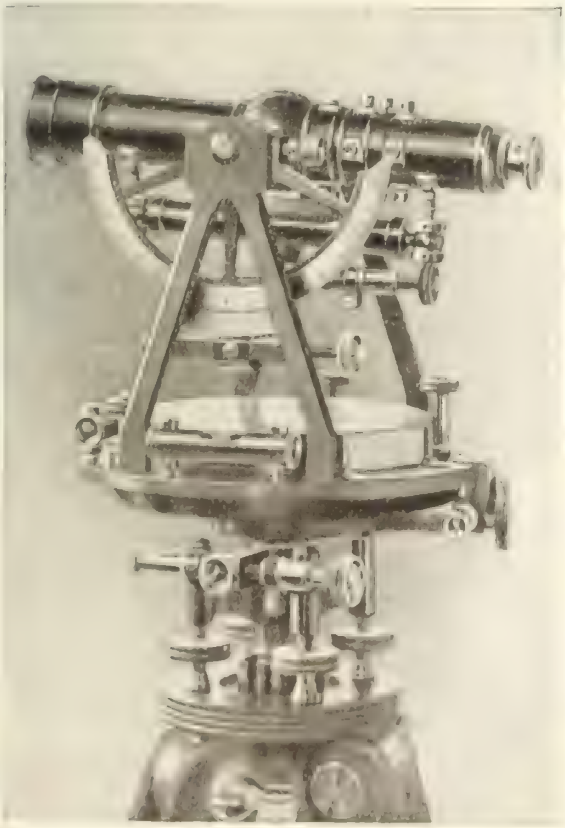

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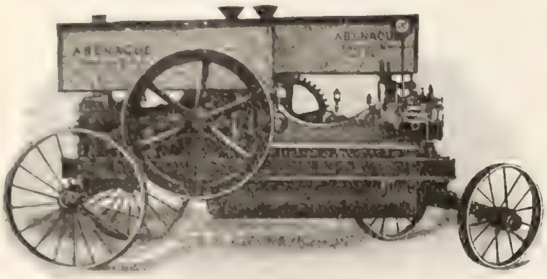

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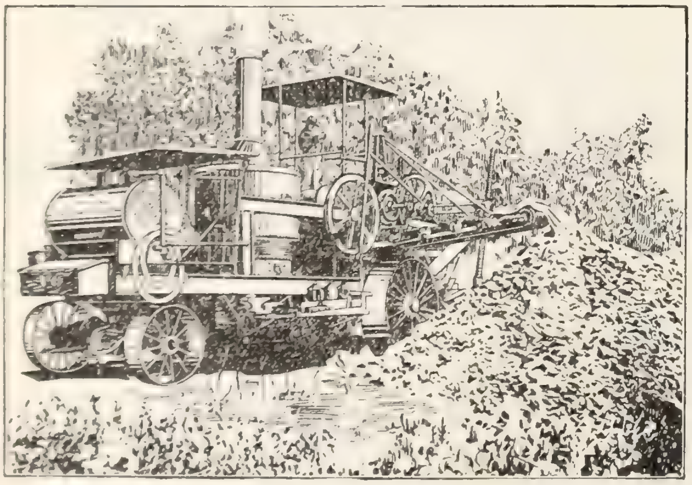

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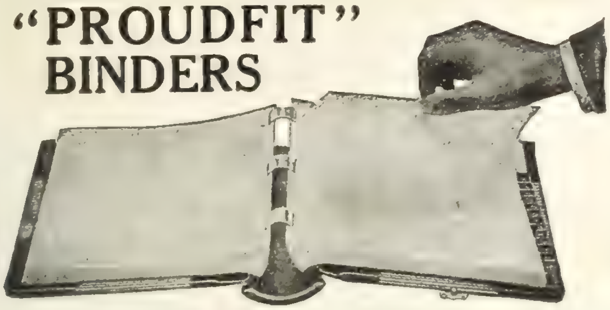

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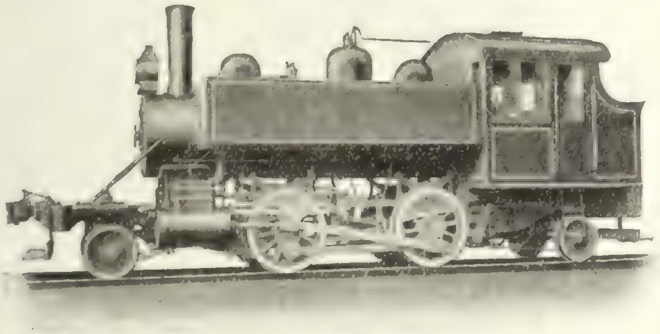

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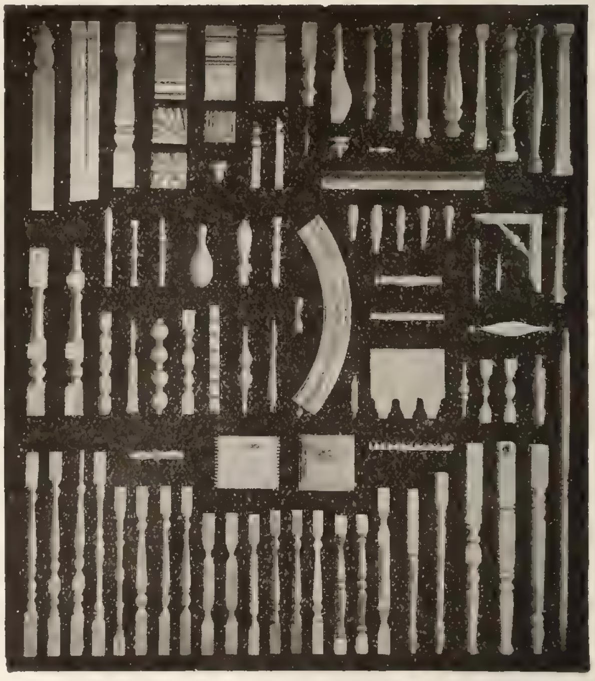

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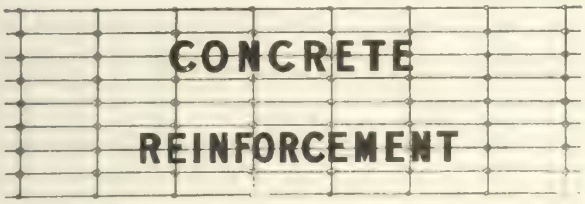

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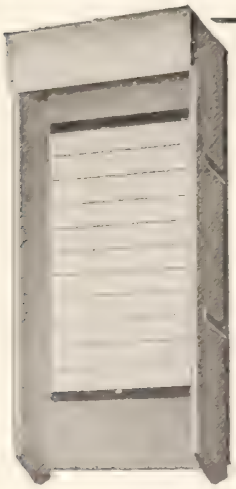

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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches........	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 '	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$2.65	$4.05
40	2.85	4.50
50	3.25	4.81
60	3.45	5.50
70	3.75	6.32
80	4.25	6.87
85	4.70	7.70
90		9.07
96		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

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Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 per cent.

No. 4 compression bath cock	net $1.75
No. 4½ Fuller's	net $2.35

Square head brass cocks, 65; iron, 65 per cent

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 25 per cent. off; lead waste, 25 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black.		Galvanized
¼ inch	1.80	¼ Inch	2.57
⅜ "	1.80	⅜ "	2.57
½ "	2.35	½ "	3.23
¾ "	2.75	¾ "	3.83
1 "	3.93	1 "	5.48
1¼ "	5.35	1¼ "	7.49
1½ "	6.44	1½ "	8.98
2 "	8.05	2 "	11.46
2½ "	12.85	2½ "	18.30
3 "	16.86	3 "	24.03
3½ "	22.57	3½ "	33.65
4 "	25.65	4 "	35.90

Malleable Fittings—Canadian discount, 40 per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-nch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.30; ¾-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $3.00.

Manilla Rope, best, per pound, 16½ cents.

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(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $7 per 100 lbs. per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, 95c. per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 92c. per gallon of 9 lbs.

Turpentine, in barrels, 69c. per gallon.

Pure Red Lead, dry, $5.50 to $6.50 per 100 lbs

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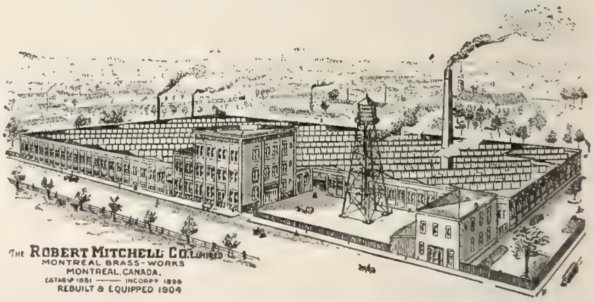
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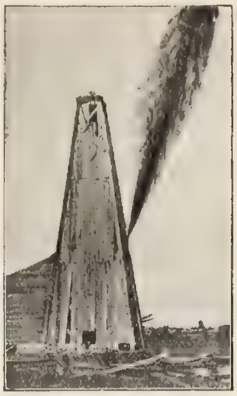

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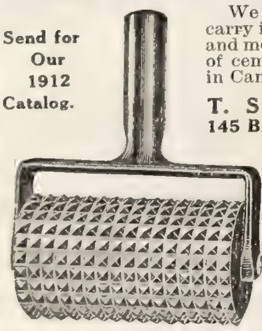

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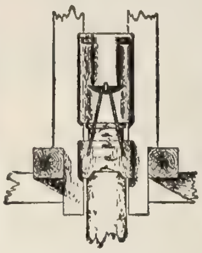

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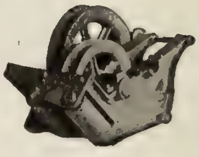

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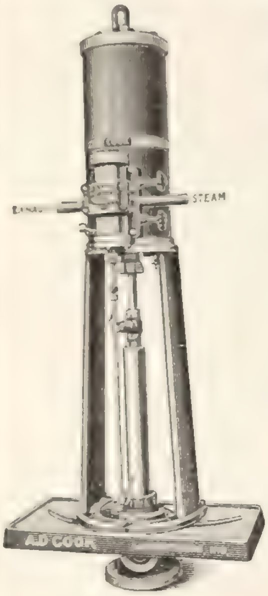

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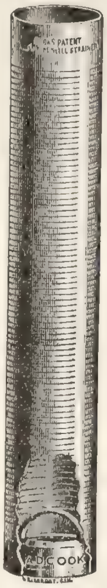

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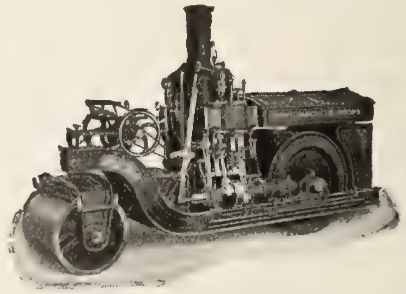

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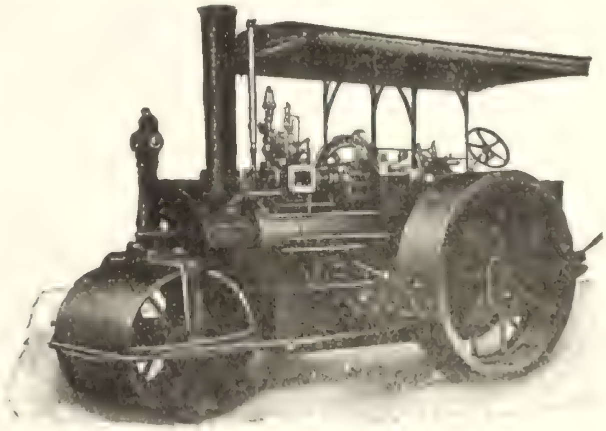
Because the Waterous Roller is built for its work. Materials are selected, its design is of the best and it is constructed in one of the largest shops in the country.

Because it has the endorsement of over 100 satisfied users.

"Ask the Man on the Machine."



¶ The Waterous Roller has these [illegible]

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¶ [illegible] form.

The Waterous Engine Works Company, Limited
Brantford, Canada

Note the tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Use Herringbone Metal Lath

on metal studs for fireproof partitions. Such partitions will not crush themselves from heat expansion. They are the lightest, strongest, narrowest and most economical partition known.

Why Herringbone?

Because the Herringbone ribs, sloping upward, act as baffles, throwing the excess of mortar back on the trowel. This makes Herringbone Lath very economical on plaster.

There are seven other reasons equally good.

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, **Toronto**
Metal Shingle and Siding Co., Manufacturers

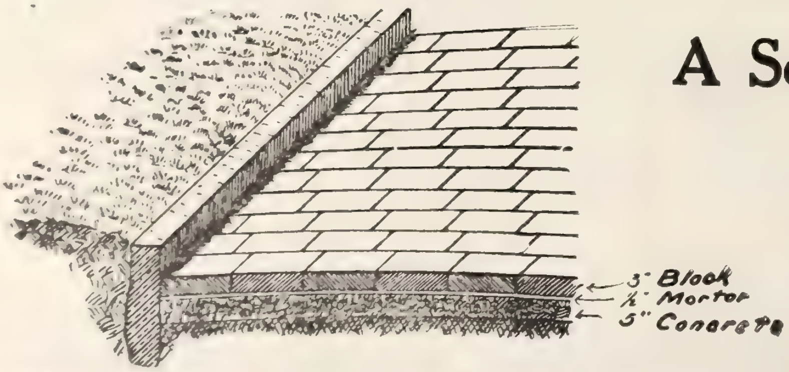
A Great Favorite

The man who knows a good thing when he sees it, and who wants a good thing when he hears of it, is the man who will insist upon having

Port Credit Brick

Architects and contractors who cater to this class of men will be acting directly in their own interests by specifying this brand

Port Credit Brick Co.
Limited
McKinnon Bldg., Jordan and Melinda Sts., TORONTO
Works: Port Credit, Ont.



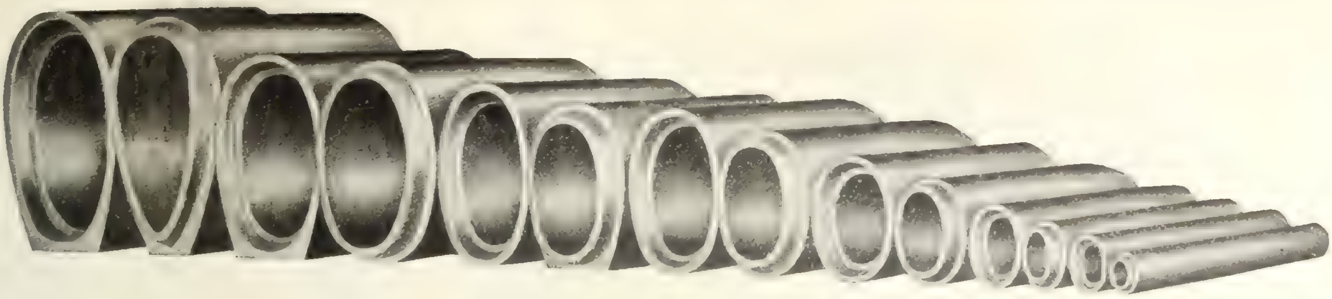
A Scientific Pavement

must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sighty and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.



Sewers and Culverts

properly built of properly made

- Reinforced Concrete Pipe -

LAST FOREVER.

OUR MATERIAL, SYSTEM and PRODUCT have been tested and approved by EMINENT ENGINEERS. NO RUST, NO ROT, NO FROST-BREAKS, NO PRESSURE-BREAKS, NO HIGH PRICES, NO DELAYS IN PROCURING, NO TROUBLE IN HANDLING.

STANDARD REINFORCEMENT, or SPECIAL if required. Stock sizes 6 in. to 60 in.

Patronize Experienced and Reputable Manufacturers.

Catalogue and prices on application.

Dominion Concrete Company Ltd.

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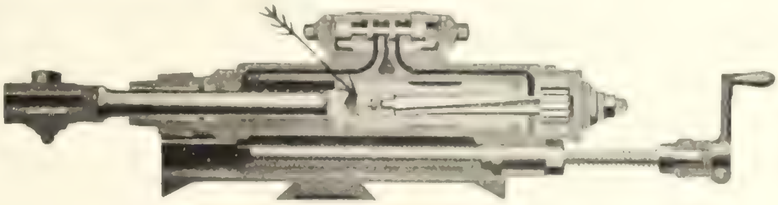
Don't Get in a Rut. Don't Form Habits in Business.

Don't allow traditions, and a stock of spare parts of obselete drills to keep you from using progressive methods and up to the minute tools.

The McKiernan-Terry "Wizard" rock Drill is the last word in a piston rock drilling machine.

It has an air cushioning device on the end of the rifle bar.



It was found by exhaustive tests that a drill equipped with this device would use 25% less compressed air, and strike about 50% more blows per minute.

This cushioning device is a basic principle, patented.

Wizard Rock Drills are built to run. Don't be mentally lazy. Order one now, any size.

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Structural Steel for Quick Delivery

We carry in stock at Montreal, 5,000 tons of Structural Shapes and are in a position to make quick shipment of either plain or riveted material for

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Estimates Furnished Promptly. Capacity 18,000 Tons Annually

STRUCTURAL STEEL CO., Limited
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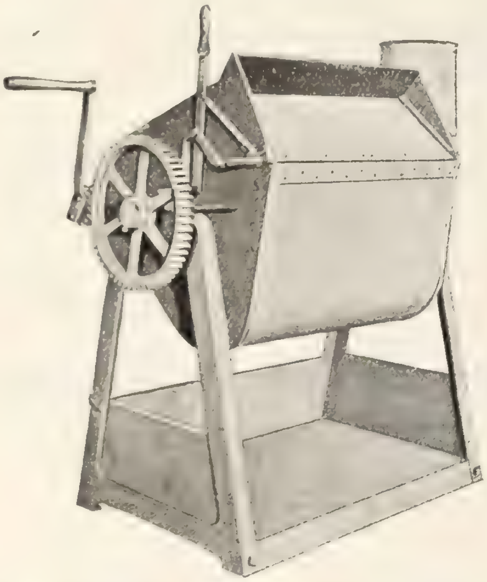
A Hand Mixer for Small Jobs

Will Soon Pay for Itself



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for any Contract that may come along, being sure that all your Equipment is RELIABLE.

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Write for references.
Enquiries and correspondence respectfully solicited.

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For VENTILATING and COOLING

The design of our Propeller Fans is along the same scientific lines as all our fan product, and that is why Sturtevant Propeller Fans deliver more air for the same size fan and with less power expenditure than any other propeller type made. The construction is particularly strong and durable.

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J. A. McTaggart & Co., Winnipeg Polson Iron Works, Limited, Toronto
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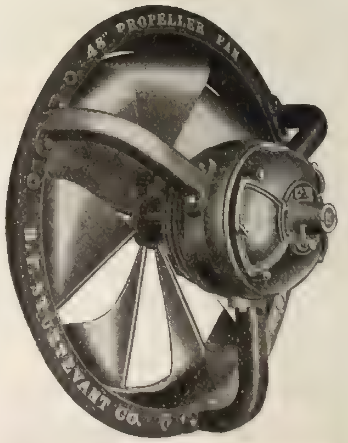

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Passing of the "tinder box" roof

Over two hundred million asbestos cement shingles were used in 1911—which goes to show that wooden shingles are rapidly losing in favor.

Summer heat soon dries, warps and splits them—and dry shingles burn quickly.

"Bestoslate"

shingles are just as easily laid, just as attractive, more economical than wooden shingles—and fire proof. Asbestos, placed under enormous pressure and the fibres interwoven into hydraulic cement, results in a shingle that is light, compact, tough and durable.

You will be interested in our catalog and Booklet giving information on asbestos building material — write for them NOW.

The Asbestos Mfg. Co., Limited

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Factory at LACHINE, P. Q.

The Asbestos Mfg. Co., Limited

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Please send me your catalog and booklet giving information on asbestos building material.

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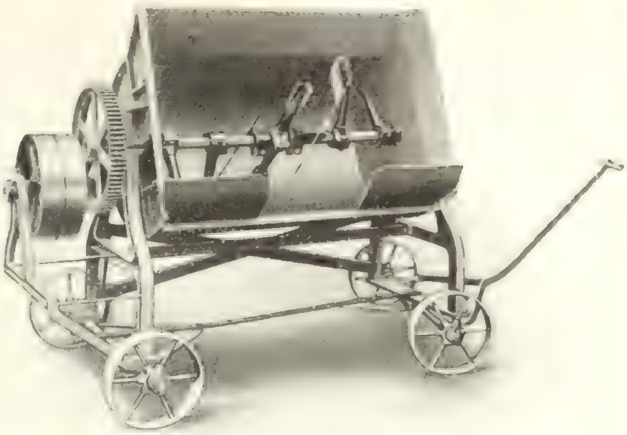

For Combination Shop and Outside Use

The Blystone Hand Truck Mixer

has been acknowledged to meet every requirement. On sidewalks and foundation work this mixer can be moved around and operated without the slightest trouble or effort.

Strong in construction and simple and compact in design, it does its work effectively without causing loss of time through operation or trouble with repairs.

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PLEASE bear in mind that a gold-brick always looks good. It has to. Its superficial appearance is its sole virtue. We are perfectly willing to admit that we are out-promised every day; but we try to make performance equal promise.

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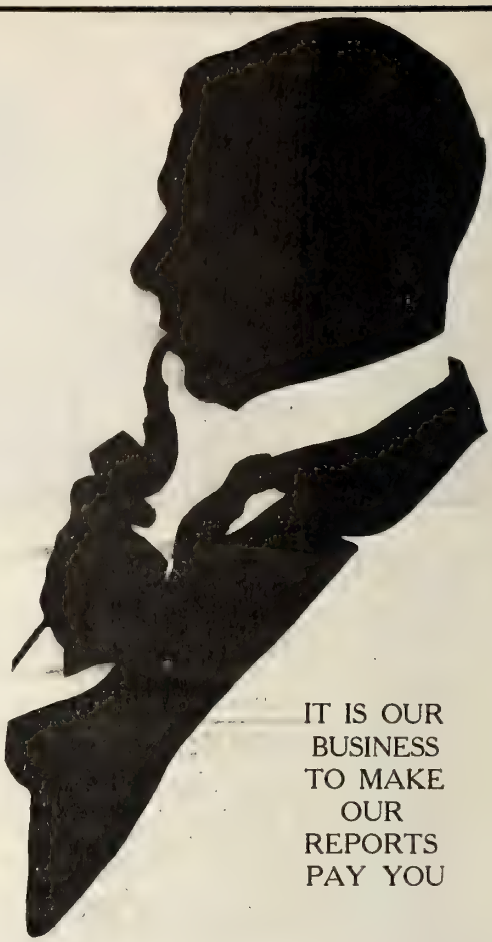

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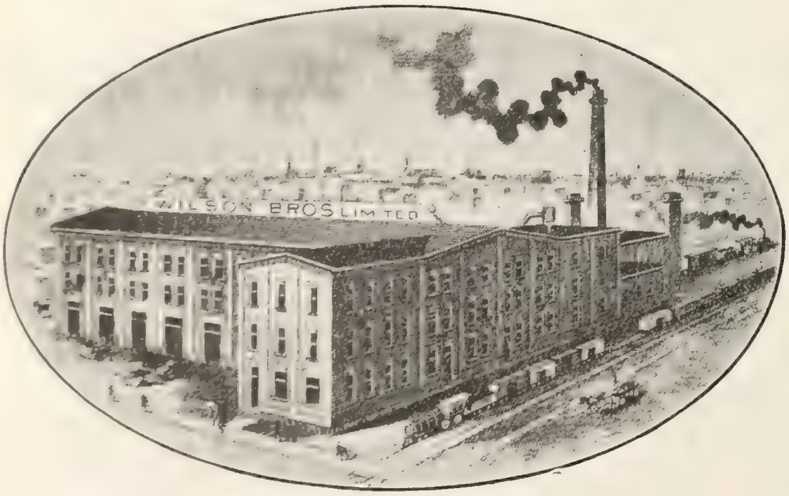

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"WILSON BROS. LIMITED" on flooring means a carefully kiln dried and well manufactured article. Our flooring is straightened, hollow-backed, bored, end-matched, steel polished and bundled. -:- -:- -:-

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Contract Record
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The only way to get daylight properly distributed through any building or store (unless it is in the middle of a ten acre lot) is by the use of LUXFER PRISMS.

Advise us of your requirements and let us tell you what LUXFER PRISMS can do for you.

We can demonstrate every claim we make.

ALWAYS SPECIFY LUXFER PRISMS

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is the Modern Method of Reinforced Concrete Construction for Bridges and Buildings

ELIMINATION OF BEAMS means money saved for owner and builder.
THE COST OF CENTERING is greatly reduced due to saving in Beam Framing.
STOREY HEIGHTS are reduced one or two feet per storey, saving in Brick Walls.
DISTRIBUTION OF THE METAL in Mushroom System Slabs gives the greatest efficiency.

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MILWAUKEE MIXER

We are looking for a good live manufacturer to build our mixers in Canada. We have some good live representatives that are securing some fine business for us in the Canadian territory. Interested parties write us in regard to this.

Milwaukee Concrete Mixer and Machinery Co.

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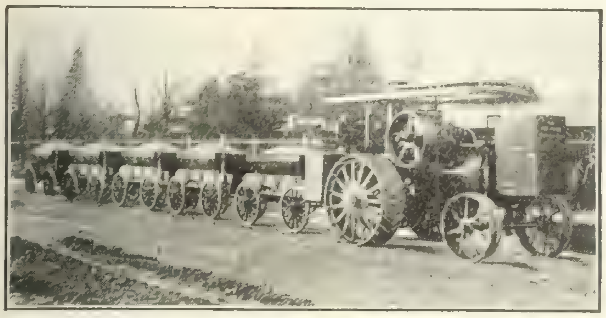

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This shows one instance of where it is accomplished by using the Huber Contractor Engine. It is specially built for hard work. An excellent power for drawing train of stone waggons, grading, machines, plows; or for operating stationary machinery.

Much more satisfactory than any form of animal power. Get detailed information, given cheerfully on request.

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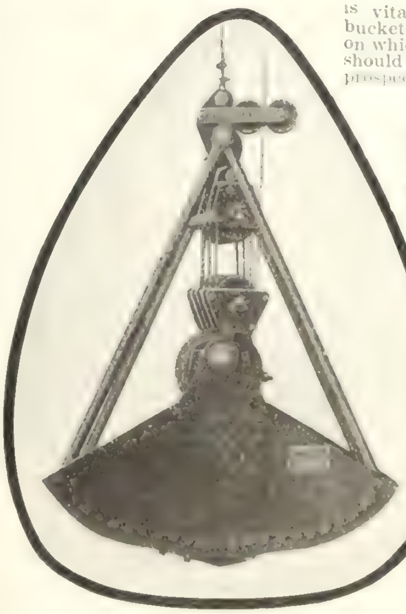

is vitally essential in all grab buckets. Therefore, the principle on which the bucket is operated should be investigated by every prospective buyer.

"OWEN"

Grab Buckets are operated on the purchase principle, exerting a digging power SEVEN times the pull required to close the bucket. This means a Full Load at every grab. With buckets operated on the power wheel or lever principal, the tendency to lift the bucket off the material increases as the jaws close, and consequently decreases the digging power of the bucket when it needs it most. The lifting tendency of the 'Owen' Bucket is reduced to the minimum and remains so as the bucket closes.

Cables are reeved over large sheaves, have fair leads, and do not come in contact with the material being handled.

Will do more work per capacity in hard materials than any other bucket.

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Galvanized Wire Wound and Continuous Stave Wooden Pipe

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WILL NOT
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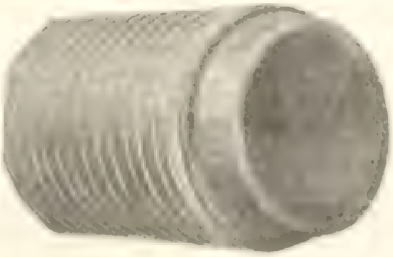

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Unaffected by Acids or Minerals

Tanks, Water Works Supplies, Complete Water Systems Installed

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NO

1. It does not last as long as a good black oil (Asphaltoilene).
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8. It will not require a top dressing.
9. It will not soil shoes, clothes or carpets.
10. It will not meet the requirements of engineers who are seeking the impossible or impractical.

IT WILL

1. Lay the dust on any road.
2. It will be clean, odorless and colorless.
3. It will leave no black dirty mess to be tracked into houses.
4. It will improve and preserve any road.
5. It can be applied any time of year.
6. It costs only a fraction of any black oil.

BUT

Don't take our word (or anybody's). See it for yourself.
Ask for sample of "Prime White". (It costs you nothing).
Also illustrated book, "Road Bitumens, Their Scientific Use and History."

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"KERR" are known from coast to coast for the reliable service they always give.

If your municipality are contemplating waterworks extension send us a list of your requirements and let us quote you.

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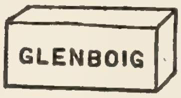
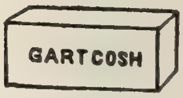


Every
Glenboig Brick
bears the brand



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Manufactured from the natural product without any sand. This makes a hard brick proof against destruction by time, tempest or climatic changes.

Specify "GLENBOIG" on your next job.

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Cabot's Creosote Stains

They have been the standard for more than twenty-five years. Their colors are soft, rich and beautiful, and guaranteed fast. They are made of Creosote, which thoroughly preserves the wood, and they contain no kerosene or other cheapener. Accept no substitution of unknown stains, because you are sure of Cabot's.

Special Shades on Request

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A Drill Runner without a Helper Reduces labor cost.

A Saving in Time means Lower labor costs.

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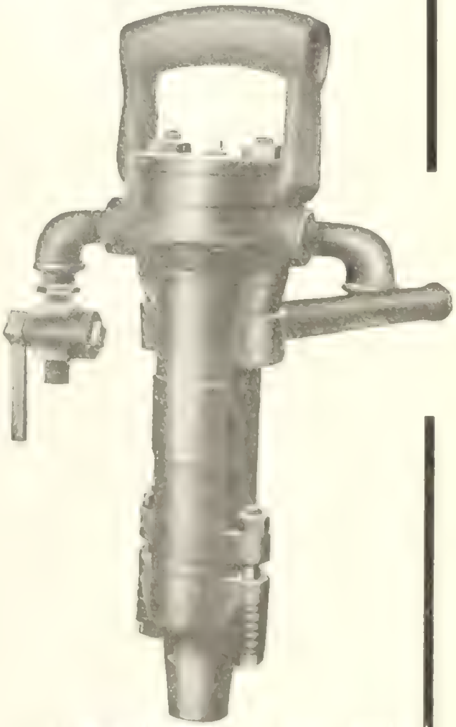
Increased Drilling Capacity per man means Larger Output at Lower Labor Costs.

All these factors combine to give a low cost per ton of rock removed or per foot of hole drilled, and they can all be effected by the use of

"BUTTERFLY" VALVE HAMMER DRILLS

LET US GO INTO YOUR DRILLING PROBLEMS WITH YOU



BA-26 Butterfly Valve Hammer Drill with [illegible] Handle and separate Rotating Handle

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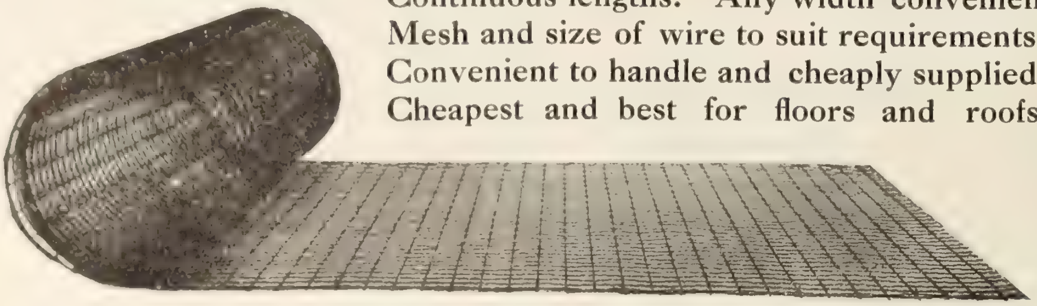

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Convenient to handle and cheaply supplied.
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MANUFACTURED BY

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Increases Factory Output

Good Light — Mutual profits. Good light increases the workman's efficiency and thus his wage earning power. Good light increases the manufacturer's outfit and [illegible] **The "Humphrey" Factory Gas Arc Lamps** flood the factory with light in the best and cheapest way.

"A factory's night-shift produces 25 per cent. less than the day-shift. The difference is wiped out by producing **Daylight Conditions."** — Labor Report. **The Humphrey Factory Gas Arc Lamps** produce daylight conditions at minimum expense. Our factory illuminating engineer will supply you with interesting data. Send for him.

Night View of one of the buildings of

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Producing daylight conditions in the Workshop or Factory

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OF ALL DESCRIPTIONS

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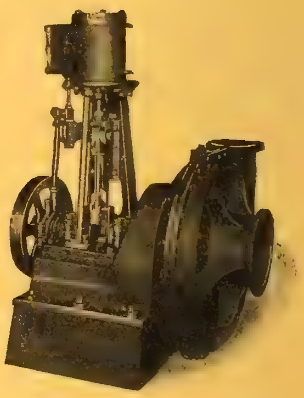

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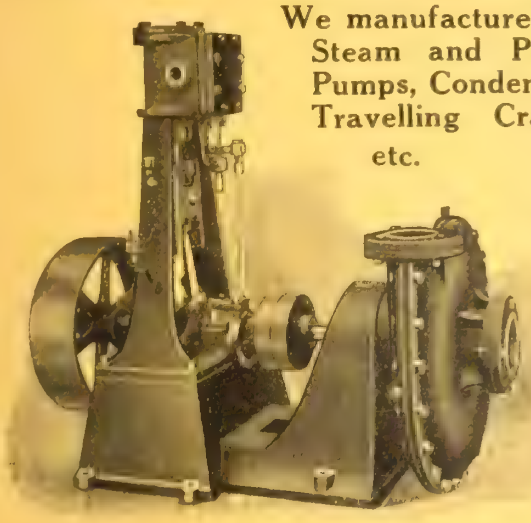
Vol. 26 Toronto, May 15, 1912 No. 20

ESTABLISHED 1886

Contract Record and Engineering Review



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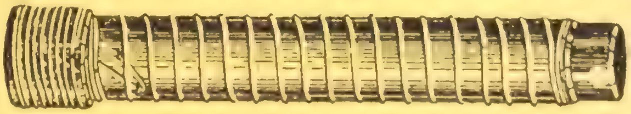

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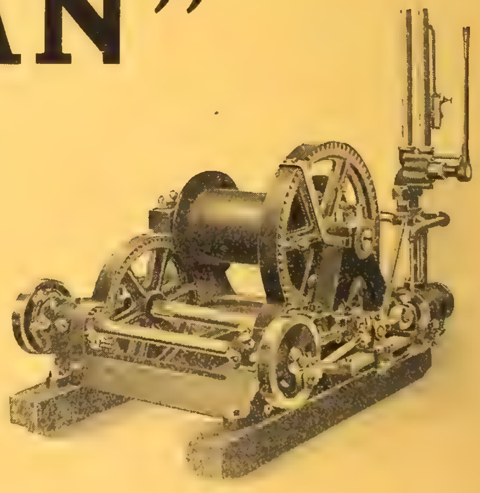

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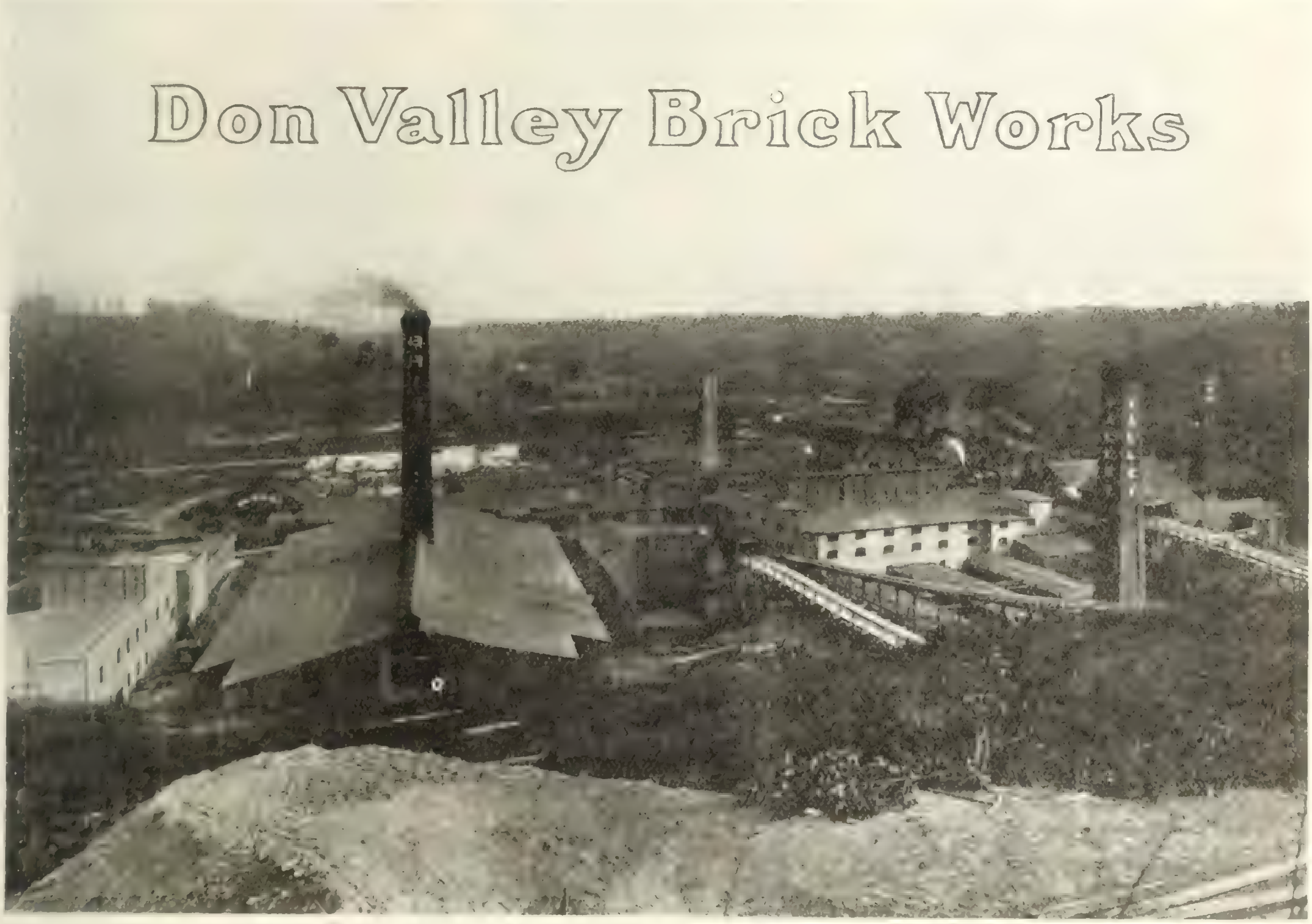

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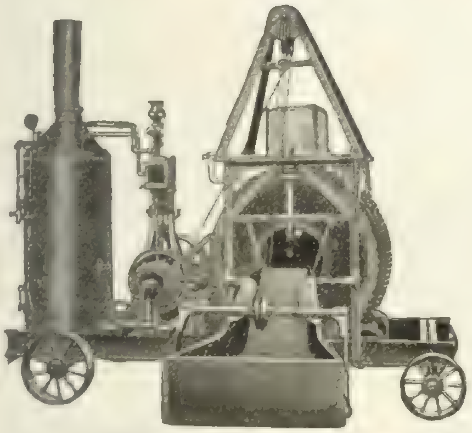

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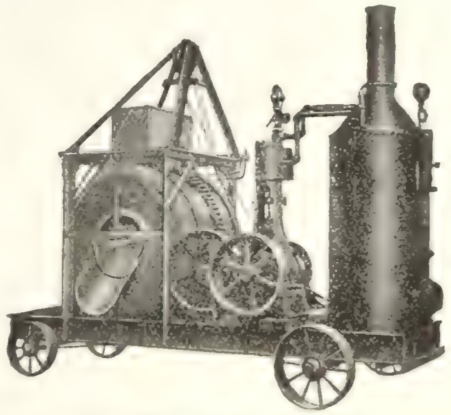

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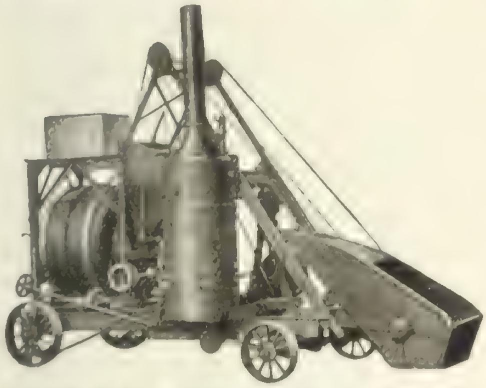

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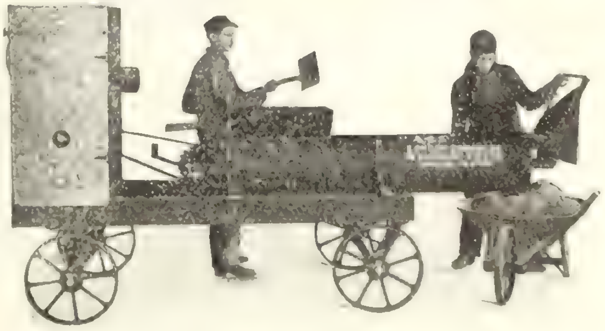

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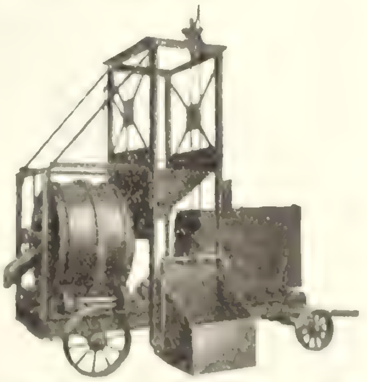

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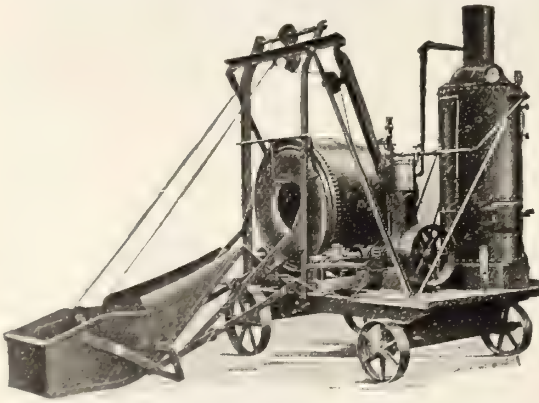

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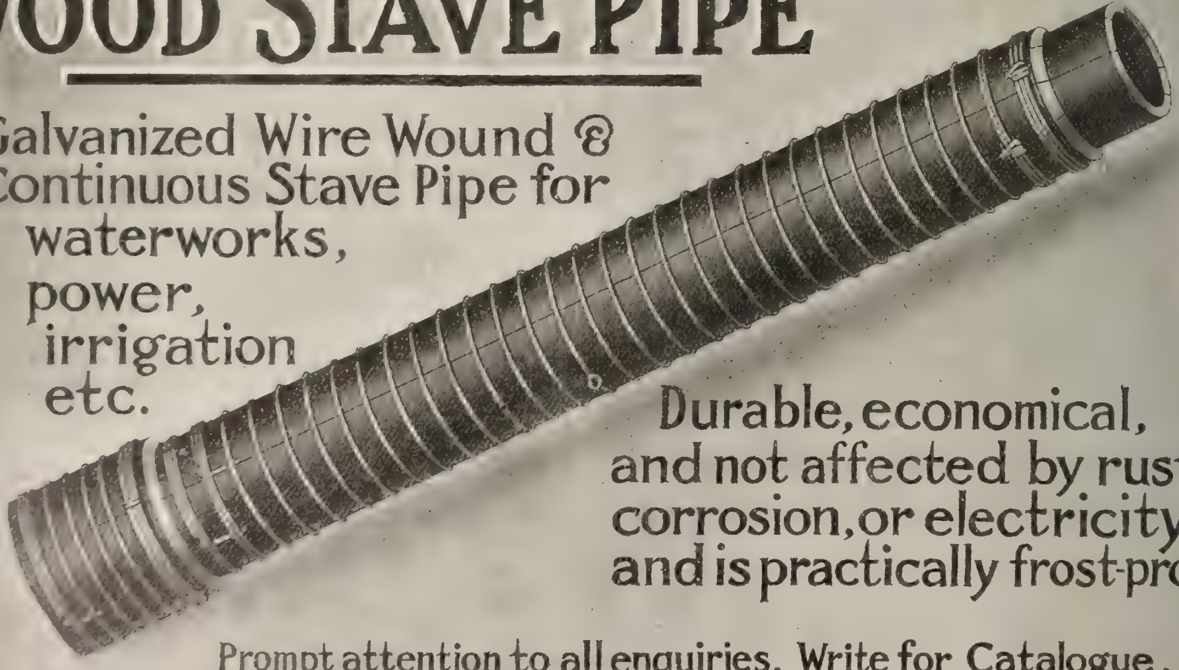

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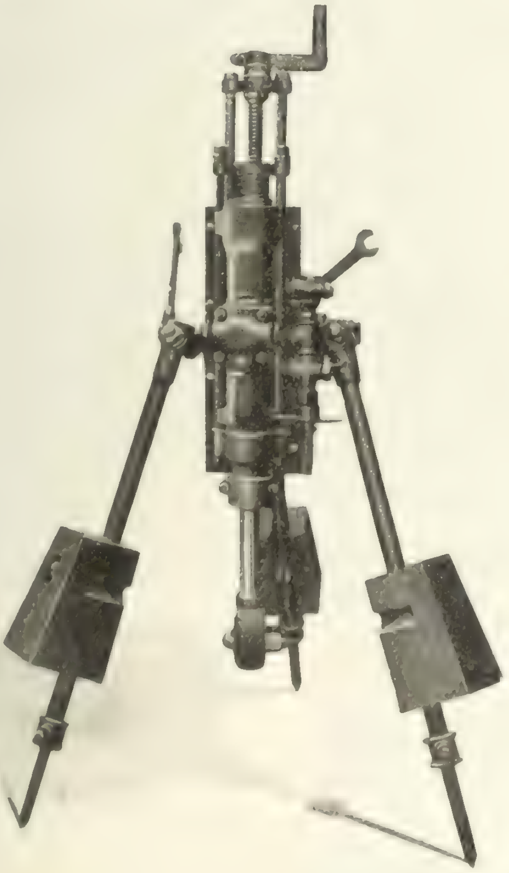

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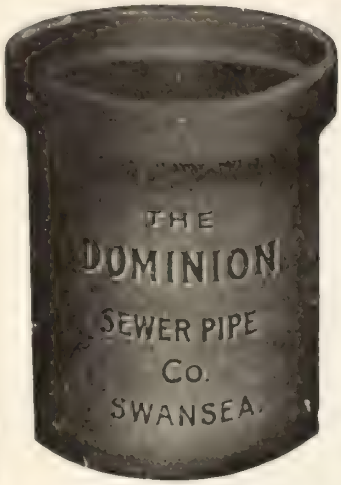

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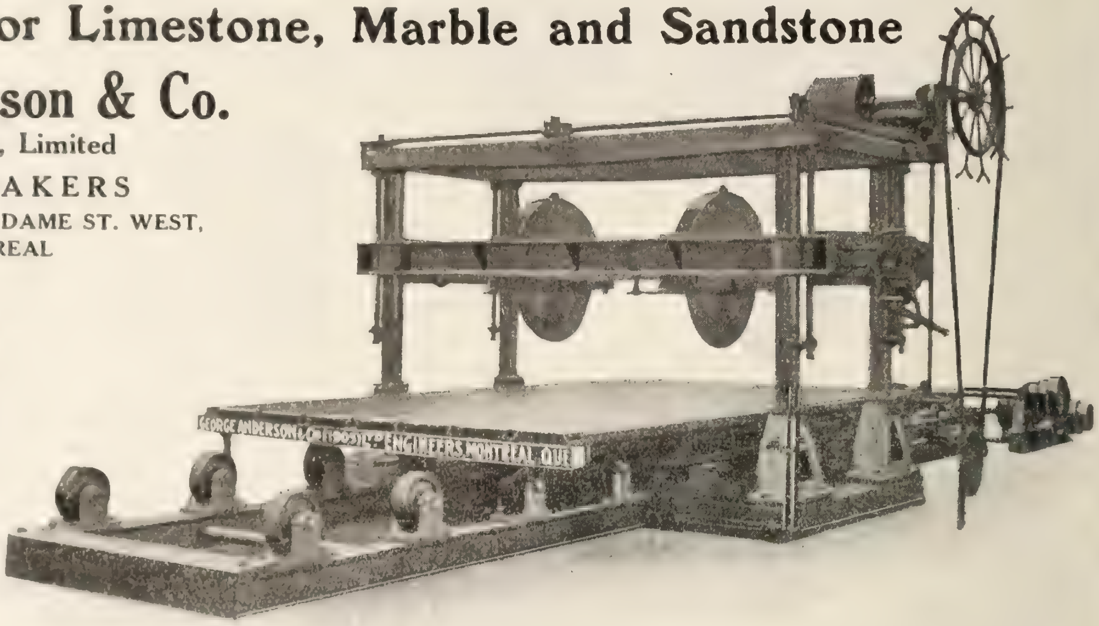

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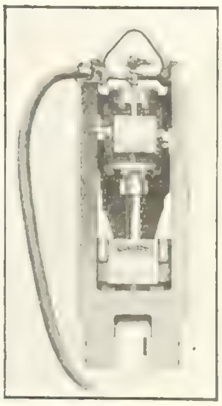

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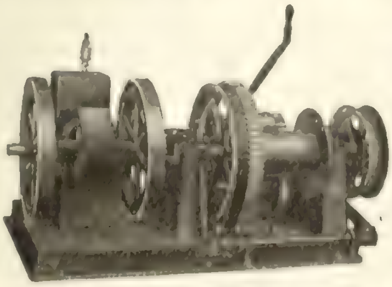

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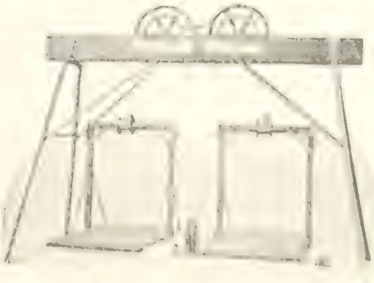

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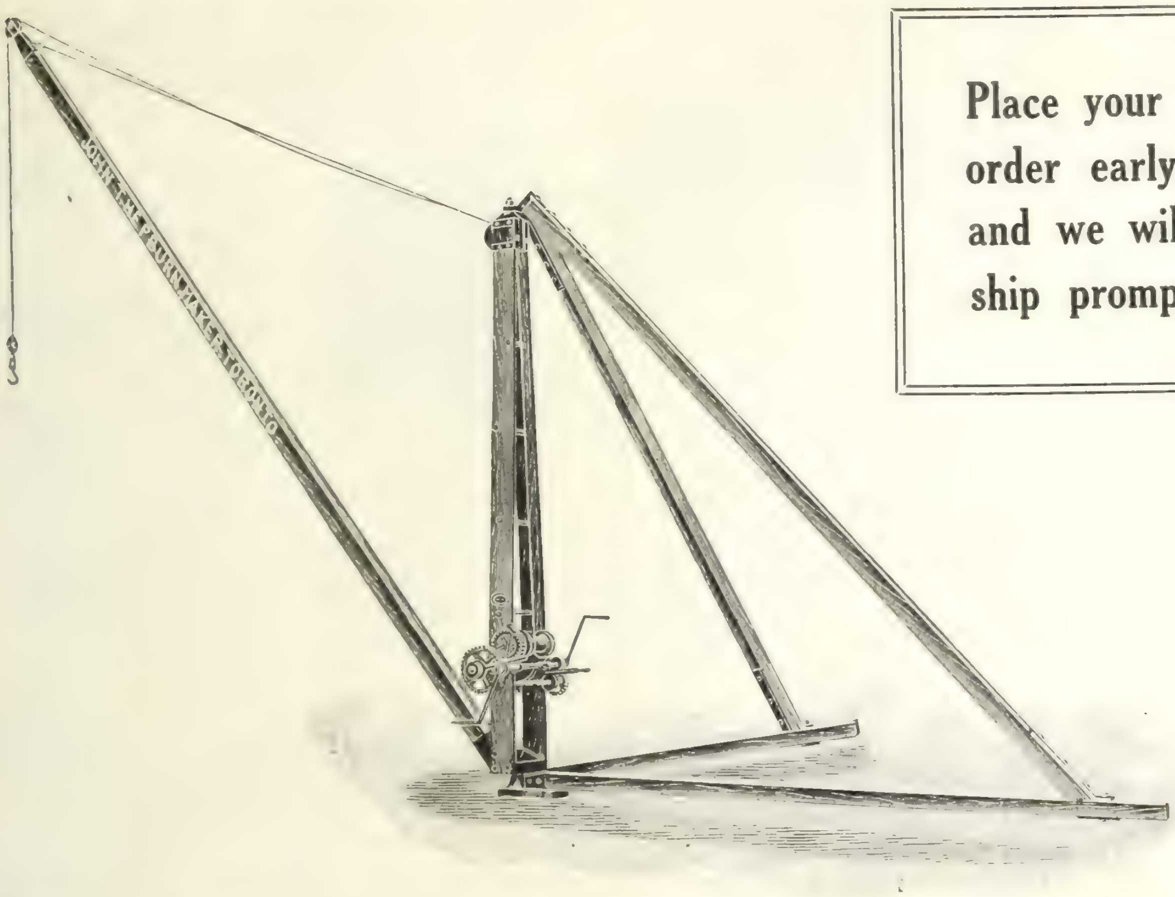
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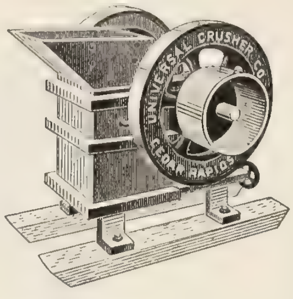

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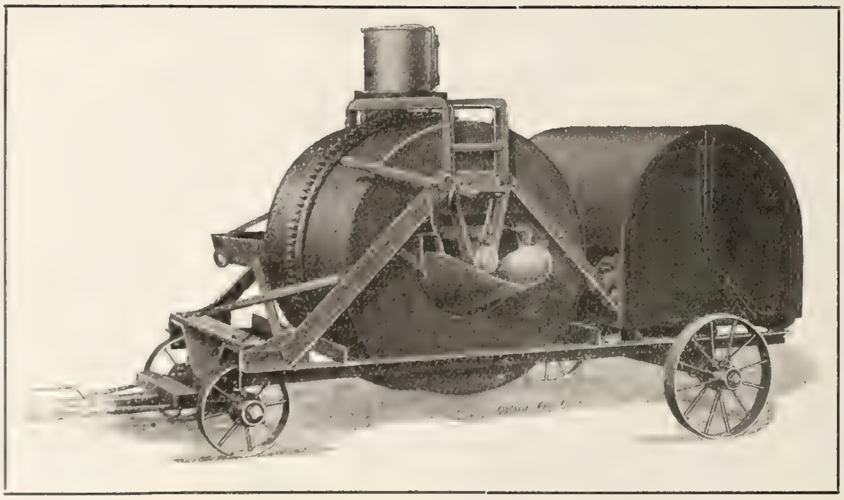

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for our water meters may be supplied in three different styles, the price of the complete meter varying accordingly. The inner works are always of the one best model. Perhaps the most inexpensive casing will give you the best service.

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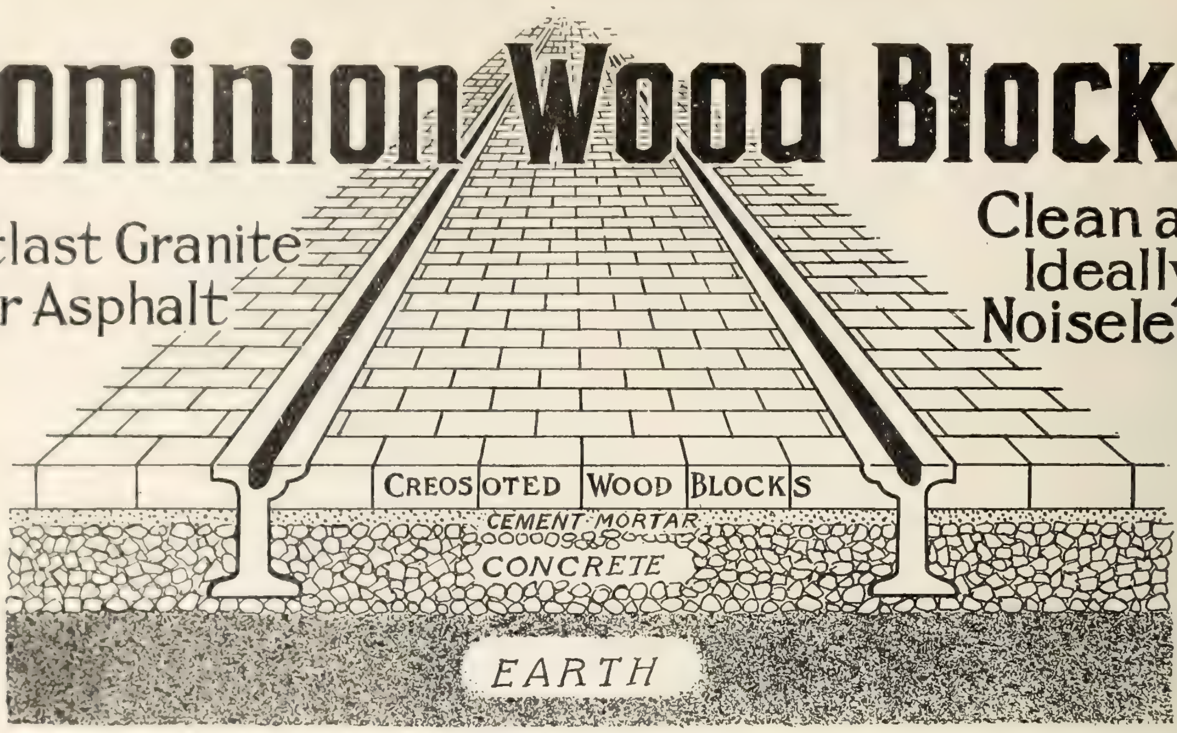

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If you have studied it at all, you must acknowledge its superiority over all other forms.

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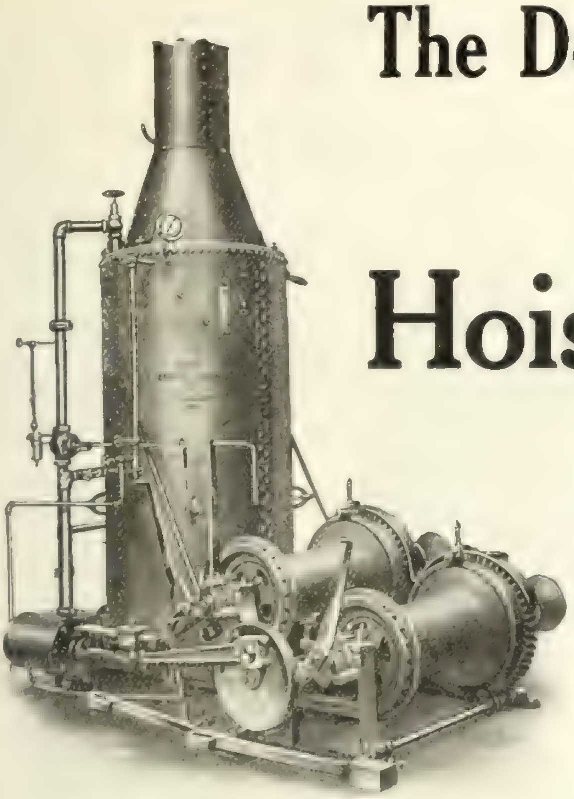

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A full line of Hoisting Engines, with Boilers to pass inspection in any province, always kept in stock at our shops, foot of Water Street, Winnipeg, Man., and Goderich, Ont.

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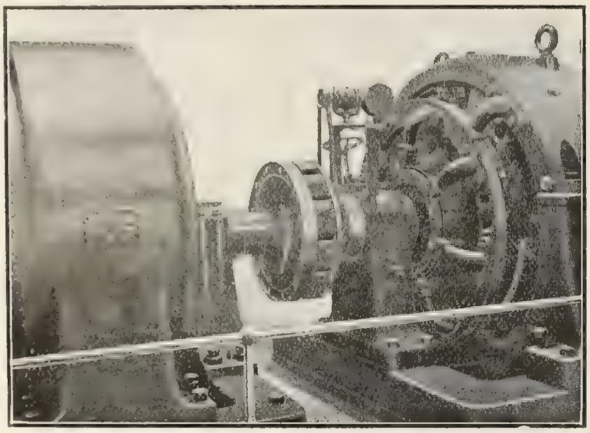

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**Steam Engines
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Plain Rounds and Squares

Cold Twisted Squares

Maxwell Deformed Bar

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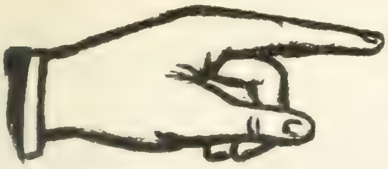

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HORIZONTAL CROWDING MOTION
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FULL CIRCLE SWING

The THEW SHOVEL has revolutionized the methods employed for cellar excavating, street grading, road construction, and light contract work in general.

The contractor whose equipment includes one of these light shovels, capable of doing the work of thirty or more laborers and economical if it replaces only four or five men, can underbid the contractor who is not so equipped. He can move a given yardage in a shorter time, at a lower cost, and with less trouble. He is recognized as up-to-date in his methods, is given an opportunity to figure upon the best jobs, and will usually receive the preference, other conditions being equal.

The THEW SHOVEL will handle cuts as shallow as 12 inches and give economical results. It will rip up old macadam and handle rough, stony ground most effectively.

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Manufacturers of **STEEL**

For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

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FLATS from [illegible] in. up to [illegible] in width, and other special sections.

Ask us for prices—they will interest you.

Office and Works : Sherman Ave., North

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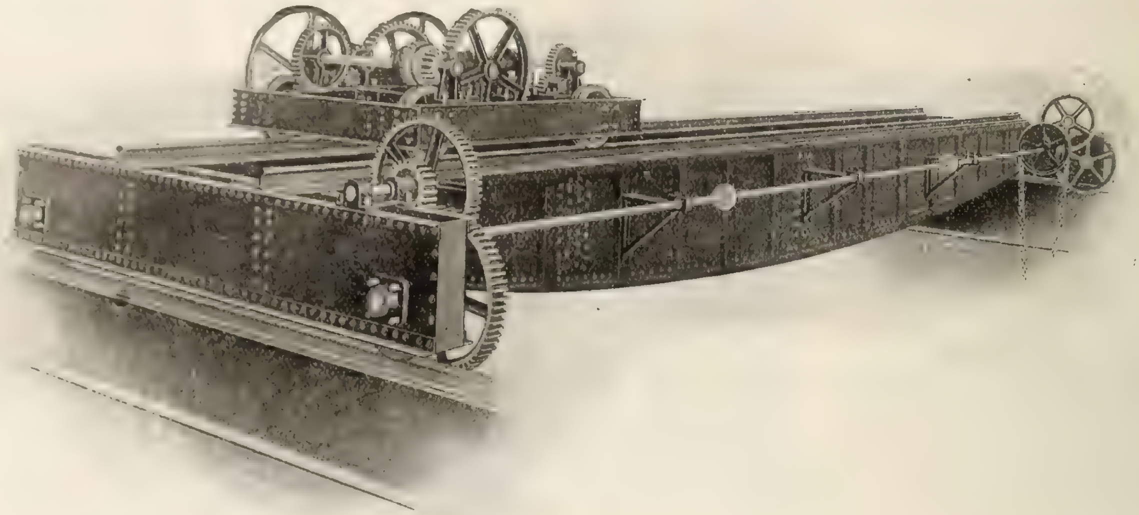

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Our experience and advice will be found worth having. Let us know the nature of your business and we shall be pleased to advise the best equipment for your purpose.

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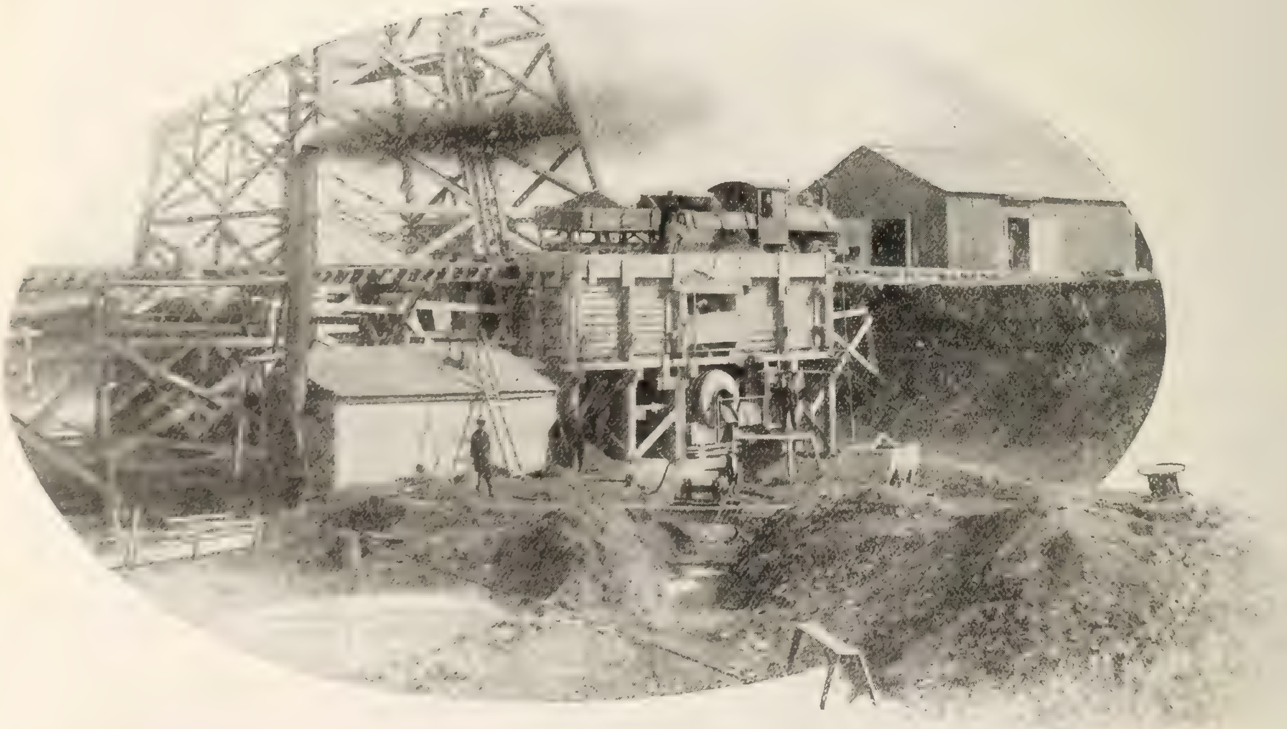

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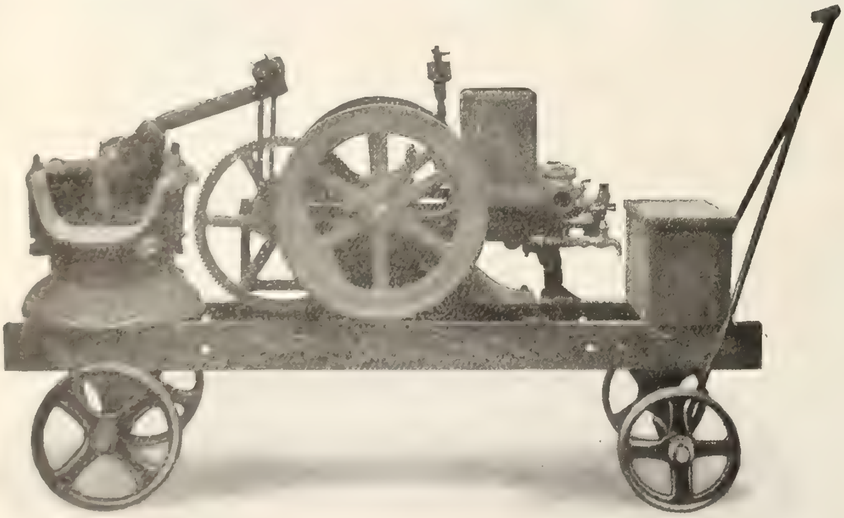

The Domestic Combined Gasoline Engine and Diaphragm Pump, as illustrated here, is the last word in the economical handling of water from cellar excavations, sewers etc., and is rapidly replacing the old style hand power, back breaking diaphragm pump, owing to its large capacity, simplicity and economy of operation.

CAPACITY 3″ SUCTION		COST OF OPERATION
3,500 gallons	per hour	2 cents
35,000 "	" day	20 "

Let us demonstrate this to you.

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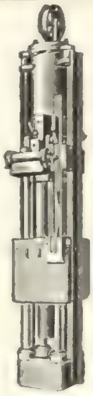
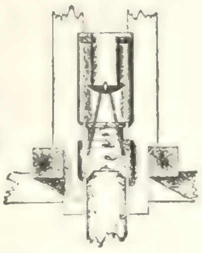
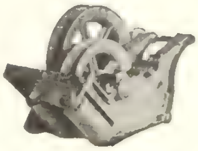


Steam Hammer



Casgrain Pile Cap



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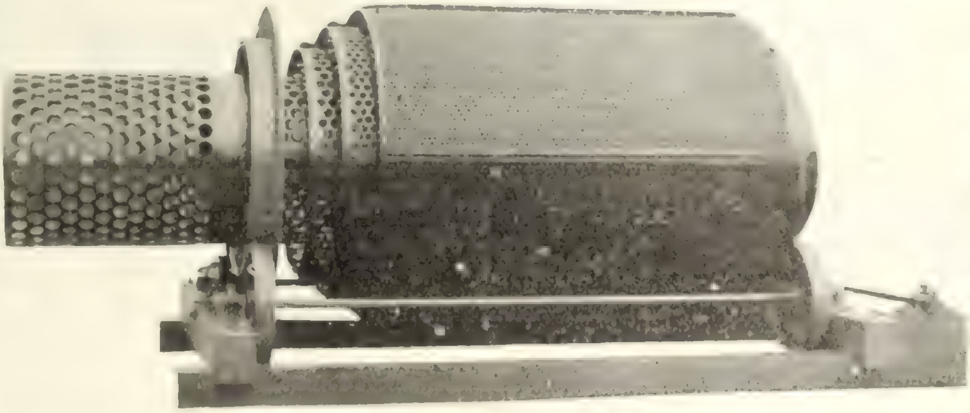
A complete Screening Machine for CRUSHED STONE and MINERALS



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Descriptive Circulars on Request to Any Address

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1—No. 0 Thew Full Circle Shovel.
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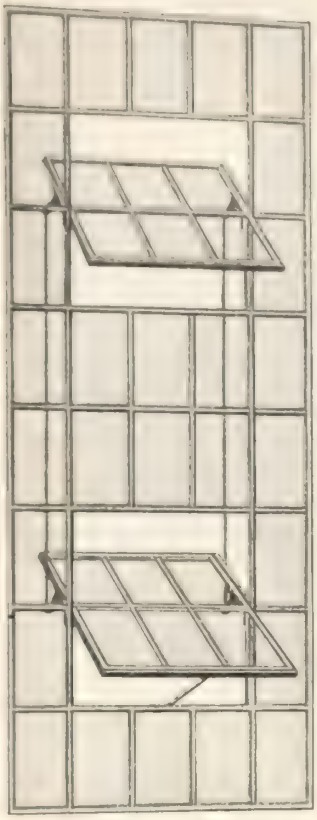

The Ormsby-Lupton "Underwriters" Steel Sash Ventilators Are Double Weathered

CANADIAN climatic conditions make double weathered ventilators essential. Our double weathering makes them, when closed, weather, rain and snow proof. *We control the Canadian patent of two-point contact* in a *ONE-PIECE STEEL SECTION.* This, our neat and very strong joint, our Underwriters' glazing clips and our finely equipped factory are some of the reasons why our Sash is finding such favor with architects, engineers and owners. Let us send you our catalog and samples.

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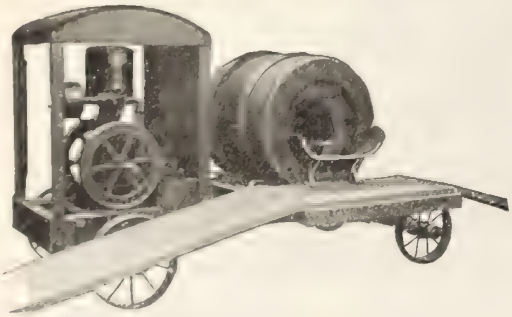
"THE STANDARD"

(Formerly "Eclipse")



Low Charging Concrete Mixers

Are Valuable Assets to Any Contractor

Simplicity in construction and operation make in "THE STANDARD" machine so little opportunity for wear that the owner, although he may have used the mixer for several years, can readily dispose of it at almost first cost.

This is easily accomplished because "THE STANDARD" Low Charging Mixer is moderate priced to begin with, the purchaser not being required to buy complicated, unnecessary and expensive charging mechanism and other devices, but the mixer drum only, simply connected and driven by the necessary power.

Many contractors take advantage of this and when doing work in various sections of the country, purchase "THE STANDARD" mixers for each job, and sell the outfit to some local contractor when the work is completed.

The simple method of operating "THE STANDARD" Mixer, the large output of high grade concrete secured, the low first cost and low operating cost, secure ready sale of the outfit to local contractors in any section.

We will guarantee that, when using "THE STANDARD" Low Charging Mixer, you will hear many words of favourable comment from the contractors and other interested parties, on both the simplicity of the machine and the high grade concrete, together with the ease and rapidity with which you can do the work.

Favourable comments are not only words of encouragement to you but encourage others to give you their contract work, and the contractor will doubtless be surprised with additional work secured when using "THE STANDARD" Low Charging Mixer.

The simple fact that the entire batch is in plain view of all, while it is being so thoroughly mixed inside the drum, is not only interesting to everyone, but thoroughly convincing of the high quality of concrete produced.

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For Planers, Dynamos, Generators, Fan Work, Etc.

A few of the lines we manufacture

Make your power Transmission an *asset* instead of a *liability*—a money-saver instead of a power-waster. Belt your machinery with

GOODYEAR

Imperial

High-Speed, Friction-Surface

Belts

"The Belt That Clings"

Built the Famous Goodyear way, for high-speed pulleys where great tensile strength is demanded

The Imperial has the cling of rubber and the endurance of many plies of hard-twist, long-fibre ***cotton fabric,*** rubberized, cured and vulcanized into one solid, enduring piece.

Earns Cost—Costs Less

The Imperial Belt is a power saver. It earns its cost by turning into increased production the power and the time lost by slippery leather belting. And it costs less.

Wears Longest Without Stretching

Most economical because it wears longest.—First, because it doesn't slip. Secondly, because it is made by a process that abolishes **internal friction.** This soon wears the life out of best leather belting and is caused by internal **grinding** as the belt bends and whizzes around small high-speed pulleys.

Instead of a few plies of coarse fabric, we build up the Imperial with many plies of fine fabric. After the **stretch has all been taken out,** rubber is forced through and all threads are separated from each other. Thus they can't rub and chew themselves, and the cause of internal friction is eliminated.

These belts are built to suit the purchaser. Let us quote prices on this most durable and economical high-speed, friction-surface, wear-resisting belting.

We also make other rubber products—Tires, Hose for all purposes, Sheet Rubber Packing, etc. Throughout, you get the same high quality materials, skillful workmanship and years of experience that have built such famous service into products of the Goodyear Tire & Rubber Co., Akron, Ohio, U. S. A. Our Sales of the last four months 50 per cent. greater than those of last year. Defective goods returned only $23.93. Write us at once.

The Goodyear Tire & Rubber Company of Canada, Ltd.

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Galvanized Wire Wound and Continuous Stave Pipe for Water Works, Power, Irrigation, etc.

Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquiries.

Write for prices.

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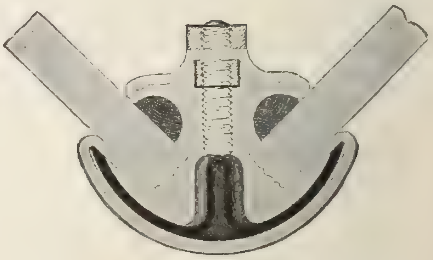
The Hester Corner Bar



No. 10

The One Perfect Bar

This is the only bar on the market that adjusts itself to any angle. Note the firm, even grip it takes on the two plates, and the self-adjusting half round moulding held in place by the inside copper stop, makes the bar a perfect fit for any angle.

Write for our catalog giving full description.

The complete Hester System of Metal Store Fronts, manufactured by the

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STEEL

Toronto Warehouse

Angles, Channels, Tees,
Flats, Rounds, Squares.
Carnegie Welding Steel.

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Structural Shapes, Bars,
Plate: Tank, Boiler, Flange
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Factory Products, Limited

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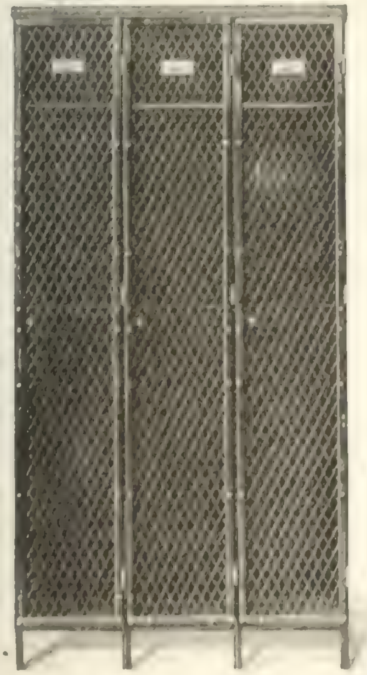
220 King Street West - TORONTO

'Meadows' Metal Lockers



Make friends because of their substantial construction and unique features. We make several styles and sizes of these lockers. We'll know what you want if you just hint at your requirements.

Send for our interesting booklet entitled

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Toronto Wire, Iron and Brass Works Co., Limited
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Manhole Covers

That Fit Snugly

Every city and town requiring street openings should see that only the best manholes are used.

We make a specially reinforced manhole cover that fits snugly and is unusually strong.

Our other products include Building post caps, plates and hangers, scruppers and brass castings.

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Building, Mechanical, Steam Supplies, and Specialties

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IT WILL PAY YOU TO HAVE OUR QUOTATIONS

"QUALITY AS WELL AS PRICE"

SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

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Europa Bath, 19 Inches Deep

96 of these baths supplied to

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The Neilson Building Collapse at Toronto

THE collapse of the south wall of the Neilson building at Toronto in which two persons lost their lives and nearly a score of others were more or less seriously injured, is fortunately—if the word may be applied—the first serious accident of the kind that the city of Toronto has known. Since the disaster many conflicting accounts have appeared in the daily press and the constructional interests are awaiting the outcome of the official investigation. With the evidence at hand one is impressed with these things: namely, the haste with which the work was prosecuted and the lack of proper inspection. The city is not altogether blameless in these particulars and the lesson which this disaster affords is one which should bring about considerable improvement. However quickly the city may be growing, and whatever demand there may be for rapid construction, it should be impossible to "take any chances" on work of this kind. There cannot be two opinions concerning the manner in which the construction of the Neilson building was rushed. On the face of the evidence, there was the erection of three storeys in as many weeks. The loading of a green wall in this manner seems capable of little defence, especially in a climate where those identified with construction have such an opportunity of observing the slow setting of mortar in cold weather.

A circumstance which probably had something to do with the collapse was the unequal drying of the partly set mortar on the two sides of the wall. On the south side it was exposed to the direct rays of the sun, while on the inside there was the lower temperature of the interior of the building. It is possible that the mortar on the outside was dried out before it had an opportunity to set. In such a case the mortar would lose its binding properties and strength and would crumble under the slightest pressure. Experienced builders carefully guard against rapid drying of this kind in warm weather by wetting or flushing the work with water. In this way sufficient water is provided to furnish the amount required for proper setting in addition to the amount lost by evaporation. In the case of the Neilson building the "killing" of the mortar on the outside of the wall was facilitated by the fact that it was placed in cold weather. So great is the retarding effect of low temperature on setting that when warm weather does come the water in the mortar is largely evaporated before the setting can take place. The observations of those who have examined the wreck appear to agree in that the bricks from the collapsed walls are clean and show little or no mortar adhering to them. Had the setting been advanced it is probable that rupture would have been through the bricks in many instances rather than through the mortar.

There appears to be some doubt as to the adequate tying of the walls to the interior frame of the building. While it is possible to erect a mill construction building in which the walls would be properly tied in, there are nevertheless many such buildings lacking in stability as far as the walls are concerned. The resting of the ends of joists on stirrups is of no value in securing the walls and it may be questioned if the straps from joist to joist over the girders and the wall anchors employed in this type of construction are sufficient to prevent the heavy buckling tendency of the wall subjected to unequal drying on the two sides, or to the expansive effect of flooring thoroughly soaked by rain or affected by a period of damp weather.

We have referred to the lack of adequate inspection. Herein perhaps lies the crux of the whole matter. The city has a ridiculously inadequate staff for this work. On all sides Toronto has been building up rapidly—too rapidly perhaps—in recent years, and in spite of such growth few if any additions have been made to the inspection staff. Supervision of construction such as was being carried out at the Neilson factory once in say two weeks is worse than useless in that it is inspection in name only and that it induces a false sense of security.

Copying Specifications

COPYING specifications is one of those temptations to which everybody succumbs from time to time, not only on account of the pressure of work which makes every little help welcome, but also because of the natural inference that a requirement laid down by some eminent engineer or frequently seen in the specifications of a large city must be meritorious, even if the reasons for it are not apparent, says the Engineering Record. Yet there is hardly a practice more to be condemned than this, and its results are sometimes ridiculous. An instance will explain what is meant.

A few years ago the specifications for a large pipe line contained this requirement: "The pipe when laid shall be tested under a pressure 50 per cent. greater than that to which it will be subjected in normal operations, and shall be absolutely tight under that pressure." This line was without relief valves to prevent excessive pressure at any point, and formed a large inverted siphon. It carried water into a reservoir, and the lowest part of the pipe was considerably below the water level in this basin. With the pipe in normal operation its inlet end was under no appreciable head and the same was true of its outlet end, but at the lowest portion of the pipe line it was under a considerable head. If the gates were closed at the outlet end, the pressure at the inlet end remained the same, but the pressure elsewhere was raised to correspond with a horizontal rather than an inclined hydraulic grade. If an attempt were made to test the pipe under the requirements of the specifications it had to be closed, and consequently most of the line was subjected to a pressure considerably greater than the operating pressure, yet of an indeterminate amount. If the desired 50 per cent. increased pressure was to be applied to the inlet end of the pipe by an ordinary method of testing it would be necessary at the same time to increase greatly the pressures elsewhere, thereby subjecting the pipe to a test far beyond that required by the specifications. In other words, this requirement, which is typical of many found in pipe line specifications, was impracticable, since it was something that could not be carried out in the field in a manner fair to the contractor.

Examples of this character could be multiplied many times, and the incentive for mentioning them at this time is that there seems to be an unusual tendency this year to reproduce such impracticable clauses, which should not be used, even if they are venerable with age. Now that several of the strong local engineering societies are entering actively into the work of reforming antiquated engineering practices, the drafting of standard specifications for the ordinary classes of engineering construction ought to receive their consideration. Engineering is already being helped forward in a most encouraging way by the work of such organizations as the American Society for Testing Materials, but their attention has mainly been fixed upon the specifications for materials and methods of testing. The American Railway Engineering Association has accomplished considerable standardization of engineering practice, but in the broad field of general engineering comparatively little has been done, although it is there that copying impossible and antiquated requirements is most in evidence.

Chief Requirements for Success in the Engineering Profession*

By Chas. T. Main

THE road to success in any business or profession is not an easy one. This is particularly true with reference to the profession of engineering. It appears to me that the chief requisites for success are about as follows:

Some natural bent or liking for the work and a good stock of imagination. This may be inherited or acquired.

Close application in the work of preparation in the school, office or field, without many outside attractions.

Industry for many years after the first years of preparation. It sometimes seems that the application is too close, but it is difficult to make a success without close application and it is a rare person who can give much time to play and yet succeed in business. Occasional let up or change of work is necessary, but for the greatest success it seems that we must work most of the time during the working years and later give up practically all of the detail to the younger men, reserving only the direction of policies, consultation work and general guidance of the business.

Knowledge of the fundamental principles of engineering which underlie all practice. This should be the aim of the scientific schools rather than an attempt to cover too much detail. The latter can be acquired after the school years. The great majority of graduates of the scientific schools take up some line of work which is different from what they had expected. It is for this reason that a man should be well grounded in fundamental principles, so that he may undertake with some intelligence any work which is put up to him.

Integrity in work and business and fairness and justice to all. In the long run, a reputation for integrity in all his dealings, rather than brilliancy in attainments, will do more than anything else for promoting the business of a capable engineer.

Some business knowledge. This is the thing which is usually lacking in the young graduate. More time spent on business law, preparation of specifications and contracts and some in common letter writing would be of great benefit.

The engineering courses in technical schools are, as a rule, not broad enough in this respect. They do not tend to make a young man a broad thinker or a good mixer. If a man can afford the time and money, a combination of the college and technical school should be of great advantage to him.

And, last of all, but perhaps the most important, is good judgment, called, oftentimes, "horse-sense," in the application of fundamental principles of engineering and everyday life.

Furnishing Qualities

Moose Jaw, Sask., May 2, 1912

Editor Contract Record:

We have noted with a great deal of appreciation your article on Quantity Surveying contained in the Contract Record of April 17th, and we are pleased to heartily endorse the sentiments contained therein.

While we must acknowledge that strong arguments may be advanced—by the contractor with technically trained men in his employ—against quantities being submitted, still we feel that the arguments on the other side are sufficiently strong to warrant the contractors giving their active support towards the adoption of the system you are advocating.

The cost and time involved by several contractors figuring quantities on the same work have been pointed out. From our experience it would seem that this question of time is of the greatest importance. To make the point clear we will refer to the cities of Prince Albert, Saskatoon and Regina, all of which had tenders closing on the same date this spring. If quantities were furnished on these jobs, a man with his cost data in good shape could land into any of these cities a few hours before closing time and after looking over the ground submit his tender. The argument on the other hand is quite apparent and it is obvious that either three men would have to be sent out on these three jobs or one man would have to spend considerably more time than he would ordinarily have at his disposal in order to cover the ground and take off quantities in all three cities.

The unit base system on definite quantities assures the contractor of payment for everything he is called upon to do, and assures the owner that he is not paying for work that is not being done.

Taken altogether, we feel that both parties are better served and that contracts are carried out more harmoniously if quantities are submitted when tenders are called. We trust that the discussion you have started will ultimately result in the adoption of that system.

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* Extract from Presidential Address before the Boston Society of Civil Engineers, March 2[illegible], 1912.

Yours truly,
Wilson, Townsend & Saunders.

Reinforced Concrete Regulations

The proposed regulations for reinforced concrete buildings which have just been submitted by the Building Acts Committee of the London County Council are commented upon by the Engineering Review (London) as follows:

A perusal of these proposed regulations shows that considerable care and research have been exercised in their drafting and that most of the important points have been dealt with in a clear and satisfactory manner.

After a few general clauses the report passes to "Floor and roof loads." According to clause 9 the equivalent dead load in pounds per square foot is 70 for domestic dwelling houses; 84 for hotel bedrooms, asylum wards, etc.; 100 for offices, counting houses, etc.; 112 for churches, concert-halls, shops, etc.; 150 for ball rooms, drill rooms, etc.; and 224 for book stores and warehouses. These figures agree in the main with those usually specified, but it seems strange that such awkward figures as 84, 112 and 224 should be taken when the figures must of necessity be approximate only; the 112 and 224 look like a relic of the times when all loads were given in hundredweights.

The treatment with regard to wind-pressure is interesting; 20 lbs. per sq. ft. is specified as the normal wind-pressure on a vertical surface which every structure must stand, while for all parts extending above the roof flat or gutter adjoining must be designed to resist a wind-pressure of 40 lbs. per sq. ft.

The span of a beam is restricted to twenty-four times the effective depth (i.e. distance from the compression edge to the centre of tensile reinforcement) unless the calculated deflection is less than 1/600 of the span (Secs. 21-23); there appears, however, to be no indication in the regulations as to the formulae for deflections that are to be employed.

Paragraphs 24-32 deal with bending moments and are set out very clearly although they seem to be given at unnecessary length; in the case of a uniformly loaded beam fixed at the ends, which has been the subject of a good many discussions, a bending moment equal to $\frac{Wl}{12}$ is specified for both centre and ends; this is not absolutely sound theoretically, but it is probably the best solution of a troublesome problem. The bending moments for rectangular slabs are set out in a more explicit manner than we have seen before. Working stresses are dealt with in paragraphs 33-40; 17,000 lbs. per sq. in. is taken for steel in tension, but no provision is made in terms of the elastic limit which would favor the harder steels; 12,000 lbs. per sq. in. is taken for steel in shear as is common, but in view of the recent work on the subject by Messrs. Smith and Turner, we should not have been surprised if a lower shear stress had been taken. A wise provision in paragraph 35 specifies that allowance shall be made for eccentric loading, a condition that designers are apt to neglect.

After a consideration of the grip length and modular ratio (given as 15) we pass to the consideration of beams; paragraphs 47-63 deal with the disposition and anchoring of the reinforcement and paragraphs 64-79 treat of the resistance moments for which the treatment in the R.I.B.A. report appears to be followed, the stresses being calculated on the method which has been called the "Straight-line, No tension method."

The consideration of the very important subject of Pillars and Columns occupies paragraphs 80-102. The treatment is by the variable stress method and agrees with that given in the R.I.B.A. report; the effective diameter of a pillar is measured to the outside of the outermost vertical reinforcement and for long columns with both ends fixed the following rules are given:

A straight-line formula is therefore adopted. For other methods of fixing the ends, ½, ¼ and 1/16 of the loads obtained from the above are specified for the cases of one end fixed and are hinged, both hinged, and one end fixed and one free respectively; this method is unusual and does not appear to be so satisfactory as the more common method of giving an equivalent length for the various end conditions.

Walls, foundations, and protection are dealt with in paragraphs 103-117 and tht final paragraphs give important directions as to materials; in these provisions cinders, ashes, etc., slag, sulphates and calcium carbonates are banned for use as the aggregate.

The regulations will repay a careful study, as they contain in a condensed form a very large amount of information on a subject that is of growing importance.

Heavy reinforced concrete girders are used in the roof of the Capital City Club at Atlanta. These have a clear span of 46 ft. 1 in. in order to carry, in addition to the roof, the weight of the floor below them, which is suspended from them by hangers encased in concrete. In this way an unobstructed 46 x 58-ft. ballroom was obtained on the floor below.

Whatever their previous experience may have been and however little knowledge of construction they may possess,—if it be limited to the construction of a dog kennel or the digging of a ditch in a back garden—some men upon their election as aldermen are forthwith convinced that they are capable of criticizing all kinds of engineering work. A Victoria paper, commenting upon such cases, recalls an incident in the travels of Gulliver Junior, who visited a community where every man who had red hair believed that he was an expert in all lines of human activity. Certainly aldermanic boards should not become imbued with the idea that they are qualified to pass judgment upon engineering details. There is no more reason in their doing so than there is in a red-haired man assuming all the talents.

The strength of concrete deposited by tremie was tested in connection with the ore dock of the Cincinnati, Hamilton & Dayton Railway, which was built at Toledo, Ohio, about a year ago. The methods of making the tests and the results are given by Mr. A. C. Everham in a memorandum to the committee on masonry of the American Railway Engineering Association, which is included in the committee's last report. The dock is of reinforced concrete, supported on piles, the lower 3½ ft. of concrete having been deposited in water. Concrete was mixed on a scow and carried by a pipe from a hopper to the point of deposit. Later, samples were taken with a calyx drill and four cores selected at random from a great many. Compression tests on these cores of 1:2:3 mixture showed an average crushing strength of 3,230 lb. and a maximum of 4,000 lb. In order to obtain a comparison with concrete placed normally, similar cores were taken from a retaining wall of the same grade of concrete and were tested. Four samples showed an average crushing strength of 2,320 lb.

The Weston Road Concrete Viaduct at Toronto

A reinforced concrete viaduct approaching a steel truss span which carries the Weston Road over the Canadian Pacific Railroad tracks has recently been completed by the city of Toronto. This structure, together with a U-shaped concrete abutment replaces a wooden trestle formerly serving that purpose.

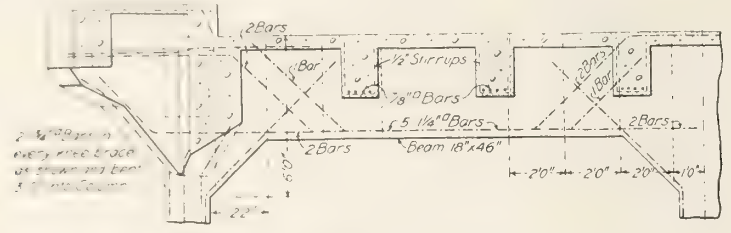
The approach to the viaduct consists of an earth fill between two concrete retaining walls, 224 ft. long and 42 ft. apart, terminating in an abutment at the upper end. The footings of these walls from the lower end to the expansion joints which are located 104 ft. from the lower end are 1 ft. 6 in. in thickness, increasing in width from 5 ft. to 7 ft. 4 in. and are reinforced with eight ⅝-in. horizontal bars, spaced as shown in the accompanying drawing, and ¾-in. transverse bars, spaced 12 in., centre to centre. At the expansion joint the footings are increased to 2 ft. 4 in. in thickness and widen to 10 ft. at the abutment, at a distance of 120 ft. This portion is reinforced with five ¾-in. longitudinal bars and ⅞-in. transverse bars placed 12 in. centre to centre. The lower section of the retaining wall, 104 ft. long, is designed as a simple reinforced concrete wall, while the upper section, 120 ft. long, is designed with counterforts. Both sections are reinforced with a double system of rods, the size and spacing of which depends upon the height of the wall. The counterforts are spaced 15 ft. on centres and are reinforced with ⅞-in. deformed bars, ½-in. vertical rods and ½-in. stirrups. The arrangement of the reinforcement is shown in the accompanying drawing. Each wall has an expansion joint 120 ft. from the abutment and is waterproofed on the inside with two coats of Elaterite, as manufactured by the Elaterite Manufacturing Company, DesMoines, Iowa. Drainage is provided for by means of 6-in. weep holes placed between the counterforts.

The viaduct for a distance of 155 ft. 4 in. is in the same line with the retaining walls, but at that point makes a curve of about 31 deg. to the right for a distance of 73 ft. 3 in., after which it continues on a tangent for a distance of 16 ft. 3¼ in. to the centre of the piers supporting the end of the steel span. The structure is supported on a series of concrete bents, with variable spacing between them. These bents are made up of three columns each, one on the centre line of the viaduct and one each under the curb stringers. The footings for the columns were carried to a depth of 6 ft. below the ground level; the area of the base being 64 sq. ft., stepped up to a 2 ft. by 2 ft. 4 in. area at the base of the columns. The columns are 16 x 20 in. reinforced by four ¾-in. bars, extending from the bottom of the footings up through the columns; at the top of which they are bent at an angle of 45 deg. passing through the floor-beams up into the floor slab. These bars are hooped with No. 12 gauge wire at 6 in. intervals.

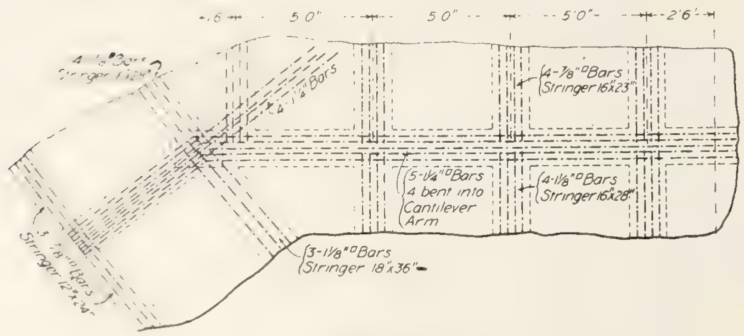
The floorbeams vary according to their position in the span from a section 16 x 36 in. to a section of 36 x 50 in. The reinforcement varies in corresponding fashion, being made up of four 1⅛-in. bars for the lighter section and eight 1¼-in. bars for the heavy ones. These bars are bent and placed as shown in the accompanying drawing and are carried through into the sidewalk brackets.

The longitudinal stringers are of two sizes, 20-ft. stringer 16 x 28 in. in section, running from the abutment through the first three spans and the next to the last span, and 15 ft. stringers 16 in. x 23 in. in section extending throughout the remaining spans. The 20-ft. stringers are reinforced with four 1⅛-in. bars and the 15-ft. stringers with four ⅞-in. bars, bent and placed as shown in the accompanying drawing. All floorbeams and stringers have ½-in. stirrups placed 2 ft. on centres to take care of the shear.

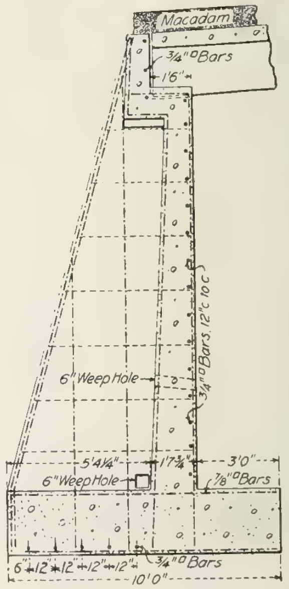
The 6-in. floor slab is reinforced with ½-in. longitudinal bars spaced 12 in. on centres and ⅝-in. transverse bars are placed 8 in. on centres. The transverse bars are bent up over each stringer to provide for the negative bending moment and turned up at each end for anchorage. The top of the roadway floor slab was brought to an exact grade, sprinkled with neat cement, trowelled to a smooth finish and waterproofed with two coats of asphalt covered with clean sand and gravel. There are two expansion joints in the floor slab, one at the abutment and one at the sixth bent as measured from the lower end. The 30-ft. roadway is paved with macadam, having a thickness of 10 in.



Section through Bent Cap



Floor System Reinforcement



Buttressed Retaining Wall

Reinforcement Details of Concrete Viaduct at the centre and 8 in. at the side, and is drained through eight cast-iron gullies, spaced four on each side.

The overhanging sidewalk and sidewalk stringers are supported on cantilever arms built at right angles to the viaduct at the end of each floorbeam and are reinforced with two ¾-in. bars bent 3 ft. into the column section and four 1¼-in. bars placed 2 in. below the top surface of the concrete and carried a distance of 6 ft. into the floor section. The sidewalk stringer is 12 x 24 in. and is reinforced with three ⅞-in. bars, two of which are bent up an angle of 45 deg., at each sidewalk bracket. The sidewalk is 4 in. thick and is reinforced with No. 16 gauge expanded metal. It is finished with a 1-in. facing of 1 part Portland cement, 1 part sand and 1 part screened gravel not exceeding ⅝-in. in diameter, which was floated to a smooth surface.

The bent supporting the steel span consists of two outer piers and a centre column. The outer piers are 6 x 6 ft. at the base, tapering to 5 x 5 ft. at the top and resting on footings each 10 x 10 ft. in area. These piers are reinforced with four ⅞-in. bars, one in each corner, and ½-in. stirrups spaced 12 in. on centres. The centre column is 20 x 20 in. with a base 2 ft. 4 in. x 2 ft. 4 in. x 2 ft. 8 in., resting on a footing with a base area of 8 x 8 ft. This column is reinforced with 4¾-in. bars hooped with No. 12 gauge wire.

Square bars were used for all of the reinforcements and a unit tensile stress of 16,000 lb. per square inch was allowed. Concrete in the proportion of 1:2½:5 was used for the retaining walls, abutments and footings for the columns. A mixture of 1:2:4 was used for the columns, floorbeams, slabs and sidewalks. All of the cement used was Superior Brand Portland.

In the design of the structure, the specifications of the city of Toronto were used. These specify the following live loads: for the slab, a load of 4,000 lb. applied midway between stringers on a strip of flooring 1 ft. wide; for stringers, a 20-ton road roller considered without impact; for the floorbeams, a 20-ton road roller with an increase of 25 per cent. in the allowable stress, and for sidewalks, a live load amounting to 100 lb. per square foot.

The viaduct was designed by the engineering department of the city of Toronto, C. H. Rust, city engineer, the contract price being $25,218. The contractor was E. C. Lewis, of Toronto. — **Engineering** Record.

The Cost of Labor in Building Work

IN a comprehensive and interesting article published in the London Building News, Mr. R. M. Kearns, F. S. I., analyzes the cost of labor in connection with the erection and maintenance of buildings. In the main, Mr. Kearns' observations are of peculiar interest to the British field but his remarks upon the advantages of the lump-sum contract and the approximate percentage of the cost of labor are worthy of note by the Canadian contracting community. The successful building contractor, Mr. Kearns observed, is a splendid organizer and controller of labor, and consequently the cost of erecting a building is reduced as nearly as possible to the minimum in the cost of the lump-sum contract. It is explained that the reference is to a contract based on an estimated amount of the cost of all labor and materials, such amount having been tendered in a bona fide competition. On the other hand, the cost of erecting a building approaches the maximum when labor and materials are paid for as day work. The following table has been prepared to show at a glance the advantages of the lump-sum contract, and the approximate percentage of the cost of labor:—

	Total Cost	Cost of labour shown in percentages of the total cost of the building.
A.—Lump sum contract for the erection of an ordinary brick building with stone dressings. Estimate based on carefully prepared bills of quantities and tendered in competition £9,500		
Extras £700		
Omissions 200		
Net cost of variations 500	10,000	(say) 40
B.—A similar building, measured in the course of erection, and valued on a schedule of competitive prices. (There is usually more daywork allowed in this form of contract than in form A.)...	12,000	45 to 50
C.—A similar building, erected entirely as daywork, all materials and labor being paid for in accordance with weekly vouchers. Labor rates and the prices of the principal items of materials embodied in the contract	15,000	55 to 60

"It will be noticed," writes Mr. Kearns, "that the percentage of the cost of labor increases with the introduction of day work. Under Contract "A" the building owner receives the full benefit of the organizing and energizing abilities of the contractor. In the case, however, of Contract "C," it is not to the contractor's immediate advantage to push forward the work with the utmost vigor, unless he is anxious to remove his plant. As a matter of fact, the longer the workmen are employed in day work, and the greater their number, the larger is the contractor's profit, seeing that he receives a premium varying from about 5 to 15 per cent. on all wages paid in that connection. The table is, of course, theoretical; but I am convinced that the figures can be supported by general experience. A salient point in connection with the lump-sum contract is that the contractor, in the absence of any special arrangement to the contrary, stands to gain or lose on the amount of his estimate, no matter what fluctuations may take place in the wages rates of the workman. In equity, however—putting aside the question as to what should happen in the case of a decrease—it would appear that some allowance should be made to the contractor when he is compelled to make a rise in wages under the force of circumstances which could not be foreseen before the date of his tender. This allowance would have to be arrived at by ascertaining in the first place the value of the measured work executed after the rise of wages takes effect, and then adding a percentage on the proportion of the cost of labor, differentiating between mechanics and laborers."

Thawing catch-basins with live steam has recently been done by City Engineer Frederick S. Pankhurst, of Niagara Falls, N.Y. With the first spring thaw it was found necessary to bore holes through the ice in the catch-basins to allow the surface water to run off. This process was slow and laborious and to relieve the situation a 25-h.p. engine was mounted on a wagon and a full head of steam was turned into the catch-basin, removing the ice quickly.

Tests on Water-proofing and Damp-proofing of Concrete and on Water-proofing Compounds

DURING the maintenance of the Structural Materials Testing Laboratory at St. Louis, Mo., a series of tests were made looking into the waterproofing and damp-proofing qualities of concrete and the properties of various proprietary compounds which are claimed to have waterproofing and damp-proofing qualities. The data so obtained were delivered to the Bureau of Standards when that office took over the work of the Structural Materials Testing Laboratory and they have been compiled and published as No. 3 of the Technologic Papers of the Bureau of Standards.

The tests include a series on 11 different mortars and 23 concretes to determine their permeability at various ages, for various consistencies and thicknesses of test piece and the absorption on 12 mortars at various ages and for various consistencies. In addition, a series of comparative tests were made on 40 compounds and several void-filling materials recommended for use advertised as "damp-proofing" or "waterproofing" mediums. The distinction between terms used in the tests is stated in the report as follows:

Permeability, Absorption and Damp-proofness

The terms "permeability," "absorption," and "damp proof" should not be confused. A mortar or concrete is impermeable (not necessarily damp proof) as defined and used throughout this report, when it does not permit the passage or flow of water through its pores or voids. The absorption of a mortar or concrete is the property of drawing in or engrossing water into its pores or voids by capillary action or otherwise. If the pores or voids between the grains or particles or in the individual grains are sufficiently large and connected from surface to surface of the wall, the concrete will be permeable to water. If the pores or voids are very minute, but connect one with another, theoretically they may act as capillary tubes, absorbing or drawing in and filling themselves with water; but the capillary forces will tend to hold the water in the pores and will prevent the passage or flow of water, even though one surface of the wall may be exposed to a considerable hydrostatic pressure. For all practical purposes a wall under such conditions would be considered perfectly water-tight and impermeable, although it may be highly absorptive. If these minute pores do act as capillary tubes and are never minute enough to prevent capillary action, the moisture either as water or water vapor would in time penetrate entirely through and fill a concrete wall, no matter what the thickness or composition. In such a case the capillary forces would not permit an actual flow of water, but these forces may carry moisture, entirely filling the wall and, unless evaporation is retarded, the opposite face of the wall would appear dry. In such a case the concrete would be considered impermeable, but not damp proof.

The three different tests made on the various test pieces were for permeability, absorption and damp-proofness. The permeability test was made on circular test pieces 7½ in. in diameter and 1, 2 or 3 in. thick, measurement being made on the amount of water passing the test pieces under a given pressure. Some tests were made on larger test pieces, 18 in. in diameter and 6 in. thick. Concrete containing large aggregate was tested in this form. The absorption test pieces were made in 2-in. cubes and were tested by measuring the proportionate increase in weight after a fixed period of time under water. Damp-proofing test pieces were of the same size and shape as the permeability test pieces, but the surfaces were made with coarse sand, but were afterward coated with the various damp-proofing compounds. The top surface of the piece was covered with a test paper which would indicate the presence of alkaline water and the other surfaces then covered with damp-proofing compound and the piece placed in water so that the water level reached up the side of the piece, but did not cover it. By this means it was possible to detect any capillary action in the piece, for water drawn into it would pass through the piece and reach the indicator paper and on account of its alkalinity from its passing through the cement would there mark its presence. In addition to these tests, 2-in. cubes were tested in compression, and ordinary briquettes tested in tension.

Deductions Made from Permeability Tests

From the permeability tests on the untreated concrete a number of tables with diagrams are reproduced in the report. From these tables and diagrams the following deductions may be made:

In nearly every case mortars 26 weeks old are less permeable than those eight weeks old, which in turn are less permeable than those four weeks old.

The richer the mixture in cement the less permeable is the mortar.

A quaking consistency is less permeable than a damp consistency.

The quantity of water passing decreases with the continuation of the flow.

Coarse sand mortar is more permeable than fine-grain sand mortar.

Absorption is less in quaking-consistency mortars than in damp-consistency mortars.

Absorption increases with age from the first to the second week in the damp-consistency mortars, but decreases from the second to the 26th week.

Coarse-sand mortars are slightly less absorptive than fine-sand mortar.

An endeavor was made to conduct the tests on the damp-proofing and waterproofing compounds in such a manner as to make the results of practical value as a determination of their comparative values.

Forty different compounds were purchased in the open market and several void-filling materials were obtained for testing. A complete record of each compound is reported as to its character, chemical analysis, method of application and the result of physical tests.

Considerable difficulty was experienced in devising a method of testing which would be applicable to all compounds, making the results directly comparable and at the same time complying with the directions for using the compound as recommended by the manufacturer.

The compounds are of two general classes, the waterproofing compounds for preventing the flow of water through masonry where subjected to a hydrostatic head, as in reservoirs, cisterns, tunnels, cellars, and the like; and damp-proofing compounds for overcoming dampness resulting from the capillary attraction and absorptive qualities of masonry, preventing dampness in habitations due to staining and efflorescence. Many of the waterproofing compounds are also recommended for use as damp-proofing mediums.

Two series of tests were made in this investigation, one of the waterproofing or water-resisting qualities of the compounds recommended for such use, and another of the damp-proofing qualities of other compounds so recommended to be used. Some of the coating compounds were recommended for use as waterproofing mediums, but after testing two or three and finding that they failed utterly it was decided to first test all coating compounds as damp-proofing mediums. All the waterproofing compounds tested and reported were such as were to be incorporated in a mortar or concrete and are known as "integral" compounds. No tests were made on felt papers or similar materials coated with bitumen or similar materials.

The name of each of the compounds is given in the report, but their behavior is recorded under numbers, which numbers are not assigned to the respective compound in the report, so it is impossible for the reader to ascertain the behavior of any particular compound. The compounds are classified under the headings "coating" and "integral." The "coating" class is further subdivided into "linseed oil, paints and varnishes," of which there are six; "bitumens," of which there are eight; "liquid hydrocarbons," of which there are five; "soaps," of which there are three; "cements," of which there is one, and "miscellaneous," of which there are three. The integrals are further divided into "solids," which is again divided into "inert fillers," of which there are six; "active fillers," of which there is one, and "antipathetic or water-repelling substances," of which there are eight, and "cements," of which there is one. The further division of the "integrals" is "active liquids," of which there are three.

A chemical review is then given in which the various subdivisions as noted above are each analyzed and described. Tests were made upon the permeability, absorption, damp-proofing qualities and the compression and tensile strengths according to the methods noted above, and tables and diagrams accompany the report giving the behavior of the test pieces treated with each of the various compounds, which, as noted above, are specified only by number.

Summary

As a result of the tests, the following summary is given in the report:

Portland-cement mortar and concrete can be made practically water-tight or impermeable (as defined above) to any hydrostatic head up to 40 ft. without the use of any of the so-called "integral" waterproofing materials; but in order to obtain such impermeable mortar or concrete considerable care should be exercized in selecting good materials as aggregate and proportioning them in such a manner as to obtain a dense mixture. The consistency of the mixture should be wet enough so that it can be puddled, the particles flowing into position without tamping. The mixture should be well spaded against the forms when placed, so as to avoid the formation of pockets on the surface.

The addition of so called "integral" waterproofing compounds will not compensate for lean mixtures, nor for poor materials, nor for poor workmanship in the fabrication of the concrete. Since in practice the inert integral compounds (acting simply as void filling material) are added in such small quantities, they have very little or no effect on the permeability of the concrete. If the same care be taken in mixing the concrete impermeable without the addition of waterproofing materials as is ordinarily taken when waterproofing materials are added, an impermeable concrete can be obtained.

The damp-proofing tests as conducted would indicate that Portland-cement mortars can be made not only impermeable but damp proof as well, as defined above, without the use of any damp-proofing or waterproofing compound. However, these tests should be interpreted with caution, as the evaporation may have been sufficient to care for the slight amount of moisture coming through the test pieces without indicating on the filter paper. Thus it cannot be stated that if a material were used which was damp proof according to this test, if used as a basement wall, one surface being constantly exposed to moisture and the other surface in an inclosed room where there would be little or no circulation of air, that the interior surface would not appear damp and the atmosphere become saturated with moisture.

The tests of coating materials as damp-proof mediums can be considered as only preliminary, but the results, considered along with the chemical discussion, throw some light on their comparative merits. The mortar used in these tests was, perhaps, too coarse and too absorptive for a fair test. The purpose of the rough surface was to test the flowing qualities of the coating, and it would seem that many of the failures may be due to the poor or imperfect spreading and adhesive quality. Several of the compounds deteriorated and proved their unfitness for the purpose intended.

Well graded sands containing considerable graded fine material are preferable for making permeable concrete, but if such is not to be had, fine material in the form of hydrated lime, finely ground clay, or an additional quantity of cement will be found of value.

Where Portland-cement mortar is used as a plaster coat if sufficient cement be used and the sand contains sufficient fine material (or a fine material be added) and the mortar be placed without joints and well troweled (care being taken not to overtrowel, which may cause crazing) the coating will be effective as an impermeable medium without the use of any waterproofing compound.

As a precaution, under certain conditions, it is undoubtedly desirable to use bituminous or similar coatings, even on new work, as protection where cracks may occur due to settling of foundation or expansion and contraction caused by temperature changes. In large or exposed work it is practically impossible to prevent some cracks, but where cracks can be prevented no coating whatever is required to make the structure impermeable.

The permeability of Portland-cement mortars and concretes rapidly decreases with age.

None of the integral compounds tested materially reduced the absorption of the mortars before they were dried by heating at 212° F. Thus they would have little or no practical value. But some of the so called integral waterproofing compounds did decrease the absorption obtained after drying the mortars at 212° F., and the rate of absorption was much slower in these cases. The addition of hydrated lime and clays seemed to have little or no effect on the absorption.

The addition on any of the compounds tested to a mortar in the quantities as used in these tests does not seriously affect the compressive or tensile strength. The addition of the inert void fillers to mortars, as used in these tests, up to 20 per cent. of the volume of cement increases the compressive strength.

Loose-leaf field notes are used by the engineering staff of Mr. F. L. Anders, city engineer of Fargo, N. D. In his latest report Mr. Anders states that the field note sheets are 4½ x 6¾ in. When ready for filing and indexing these sheets are pasted on 5 x 8 in. division index cards which have the usual five-cut tab. On this tab the character of the work is printed and the indexing completed. The time of men employed on any class of work is kept in a similar manner.

The Moulded Brick in Ornamental Work

Various Satisfactory Uses and Methods which Exemplify the Importance of Studying all Building Material and Its Application

By W. G. Kerby

THE use of the moulded brick for ornamental work is one which has not been grasped as it should; nor have the still further possibilities of this particular accessory been adequately recognized. To-day we find the moulded brick mainly utilized for cornices, stringcourses, or plinths; in the majority of cases by a more or less feeble imitation of Gothic, Classic, or Renaissance work, or a bad combination of all three.

It is not my intention to illustrate this section with examples in the above-mentioned positions. Combinations of individually-moulded bricks forming such compiled features can be seen practically anywhere, although it requires a very thorough study of Classic architecture to utilize to the greatest advantage such as are based on these principles. There are other positions where the moulded brick can be most satisfactorily introduced, with more original and beautiful effects, to the advancement of ornamentation in this medium. Perhaps the principal one would be as an accessory in panelled work. Three or four of the commonest kinds of moulded brick are shown in Figs. 1 and 2. Taking these for a basis to work upon, their application to panelled ornamentation is shown by the succeeding figures. The first illustration on Fig. 3 shows the application of the splayed brick to small-pattern diaperwork of half-brick width, in raised and sunk work, with a half-brick spaced opening. The second illustration on this figure shows similar bricks utilized for flush-faced patterns, or a simple sunk opening. These bricks usually have a splay of 45 deg., and are readily obtainable at this angle, as also are the common triangular or pointed coping-bricks for 4½ in. walling; these, backed together, from the centrepiece of the diaper.

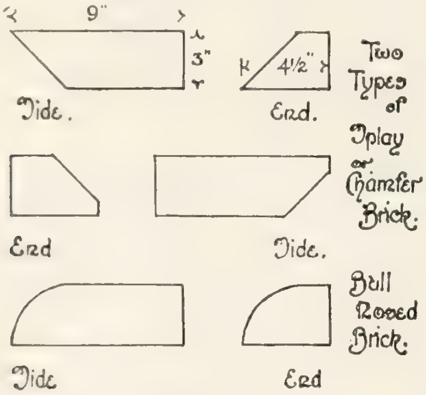


Fig. 1

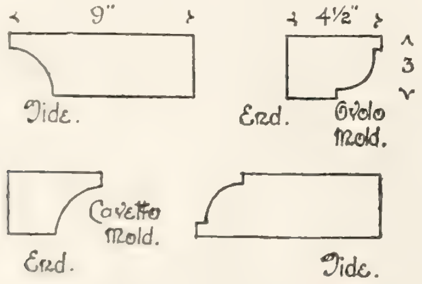


Fig. 2

Here, at once, we have all that is requisite for the designs shown—in materials ready made to hand, obviating any necessity for cutting in their actual execution; whilst many of the other designs illustrated would require very little cutting in the way of specially-placed bricks to obtain a different or an elongated pattern on the same principle. In studying out the latter it is essential to take one of the samples of mouldings here shown, as applied to varying widths of panelling, as the same difficulties of jointing occur with any variety of the moulded brick, when used in these positions. The next two illustrations (Figs. 4 and 5) show the same variety of brick used in the wider one-brick spacing; whilst the second illustration upon the latter figure shows a position to be avoided, on account of the bad weather-joint formed and which would in consequence, have a tendency to deteriorate quickly. As will be seen, it is necessary by this method to cut two or three of the bricks and to obtain the continuation of the correct bond in the

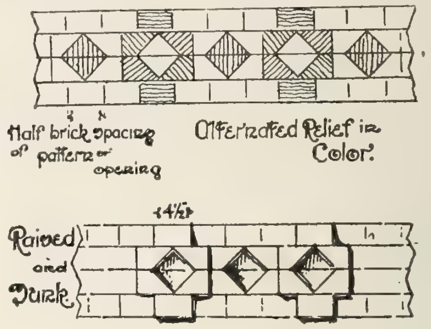

Half brick spacing of pattern or opening
Alternated Relief in Color.
4½
Raised and Sunk

Fig. 3

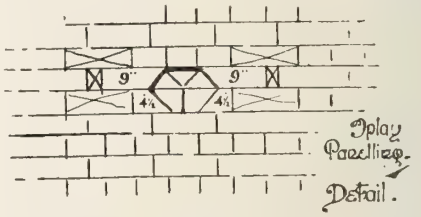


Fig. 4

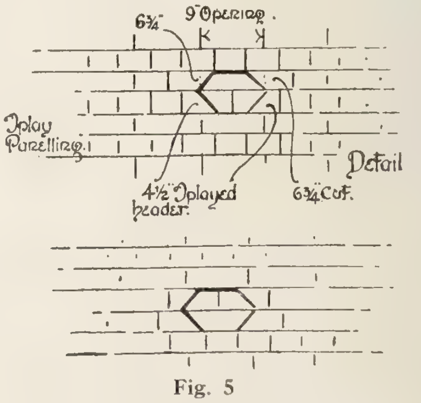


Fig. 5

same course, without interfering at all with those over or under. Fig. 6 shows a method of using the bricks in their entirety, without any extra labor of cutting at all. It involves, however, the introduction of stretchers in the positions indicated in the heading course, to pick up the bond, thus breaking the customary uniformity of this course to some extent. A Queen closer is also used, which helps to form the splayed brick panel, again breaking the uniformity of this course. One portion of the panel itself is formed by the insertion of the above mentioned pointed coping-bricks if the double splay bricks required in this position are not readily procurable.

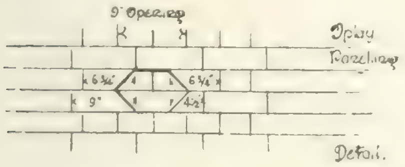


Fig. 6

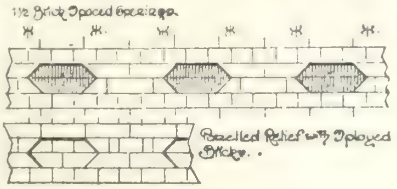

1½ Brick Spaced Openings.
Bevelled Relief with Splayed Bricks.

Fig. 7

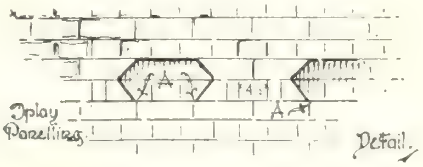
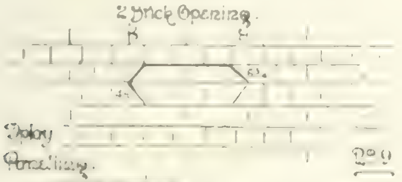


Fig. 8

Although it may be considered a disadvantage to break the correct uniform bond, as shown by this illustration, it is really not a noticeable point. The vertical jointing is broken correctly enough for all practical purposes, whilst the trifling lack of uniformity in the horizontal joints is quite unnoticeable in the general scheme, particularly from a distance, with the more powerful pattern formed by the panel itself as a foil. In many instances, though, the possibility of forming some species of ornament by way of relief, either in a continuous line or by grouping, thus saving the extra labor entailed by cutting, would prove a distinct desideratum. In all probability it will mean the difference of using some system of ornamentation or none at all. Fig. 7 shows the same-shaped panel adapted to one-and-a-half brick widths. The two courses forming the panels in the first illustration on this figure being mainly built with stretchers, giving a broader effect, more in keeping with the wider panelling. This course is, therefore, picked out into stronger relief by the heading courses above and below. It is a method quite admissible in many positions for ornamental work of this nature.

Fig. 9



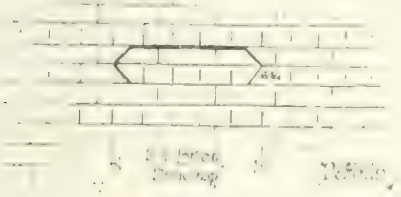


Fig. 10

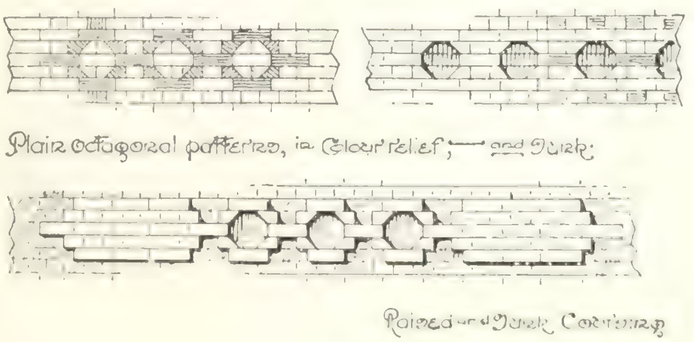


Fig. 11

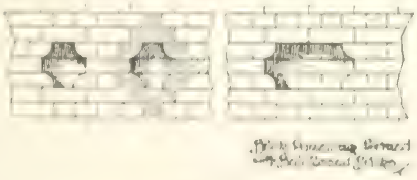


Fig. 12

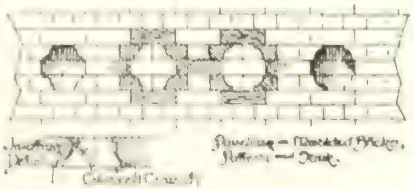


Fig. 13

In the endeavor to introduce regular alternate coursing, with the least amount of cutting, and that only in two of the panel bricks, a couple of Queen closers are used, as shown by the second illustration on the same figure. There is the same point to be noted in this illustration as mentioned previously, viz., it should not be used in the reverse position, as shown by Fig. 8. The weak jointing at AA, immediately off the splay, would have a tendency to perish quickly. Figures 9 and 10 show this panelling applied to a two and a two-and-a-half brick opening respectively. As will be seen, this principle of panelling may be applied to any length; although it requires care and methodical working out for correct brick treatment in the matter of breaking vertical joints. Any type of moulded brick suitable for such angle positions may, of course, be adapted to this work, besides the splay or any of these shown. Fig. 11 illustrates the use of the same brick in other methods of panelling. Showing the effects obtained by color relief, sunk, and raised and sunk coursing. The bullnosed, cavetto, and ovolo bricks, adapted to these positions, afford a more ornamental, and therefore pleasing relief in this class of work, as will be seen on reference to Figs. 12 and 13. A great consideration in favor of the splay brick for this ornamental work is its adaptability to the interior bonding of the wall, so far as it is necessary for such bricks to be let in. With moulded bricks built into a wall, their ends showing in this manner on the face for ornamental purposes, the customary clean, perfect jointing is, of course, impossible without a good deal of expense, either by rough rubbing or having a reverse brick to fit. It is just possible that a ready-made moulded brick might occasionally be found to answer this purpose and suit the position better than adapting the splay brick. As shown by the detail in the last illustration, the joint is raked out and pointed with colored cement putty to match the ground, the cement being tinted with brick dust, ochre, or in the event of dark colors, ashes, to obtain correct tone. Fig. 14 shows the use of small, sunk, or patterned panels, as illustrated above, when arranged in systematic and symmetrical groups to form a still larger central or intermediate pattern. Fig. 15 also illustrates how a little raised and sunk ornament so applied can be varied and massed for a central feature, such as a gable or other positions, for instance on a line of ornament. Fig. 16 is again another departure in this style, the two diagonal cross-reliefs being formed somewhat on the principal of herringbone brickwork. The centre one, although an innovation in the use of upright bricks, forms a strong relief upon the wall face. Some features could be easily arranged in the outer half-brick facing to a wall of sufficient thickness to admit of their use, without really being at all unsound constructionally, any more than the rest of the work. These patterns are readily formed by means of the splay brick and pointed coping.

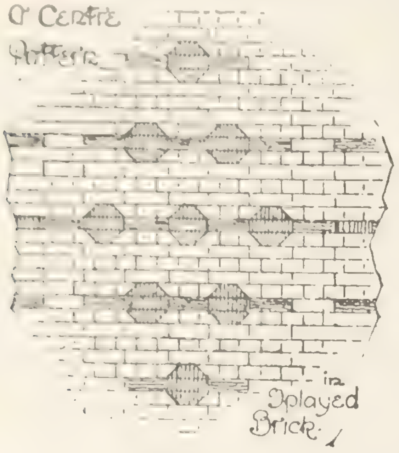


Fig. 14

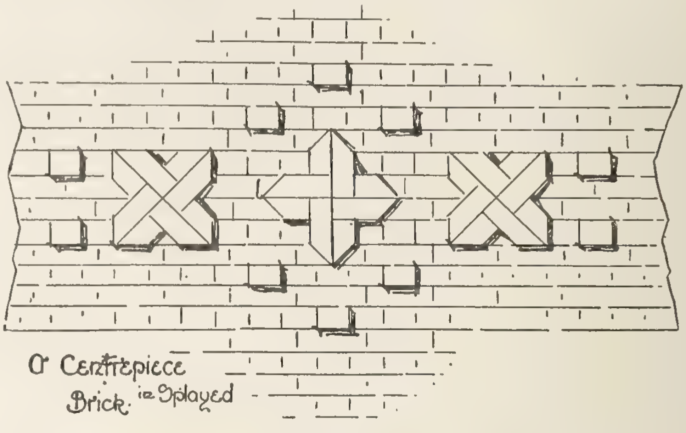


Fig. 16

The two illustrations on Fig. 17 show different methods of bonding and construction for the upright cross—shown in the preceding example—in the ordinary straight coursing of wall construction. They also illustrate how different effects may be obtained even in similar figures, by variation of the bond. This is, apparently—perhaps to the casual observer—an exceedingly slight point, scarcely worthy of note. However, though apparently slight it is one worthy of particular attention. It is by such variations as these that the customary cast-iron mechanical, machine-made appearance conveyed by the majority of regular uniformly-laid modern brickwork may be broken up. Methods of inequality in alteration, are required to effect this; the harsh, hard air of complete uniformity is so dispelled, introducing the spirit of picturesqueness. These points are well worthy of consideration, and should be studied out more in detail with regard to other examples illustrated in this work when actually applied. Fig. 18 illustrates a slightly more elaborate although not difficult, piece of work, on somewhat similar lines to the two former figures. It is also formed with splayed and three or four-pointed coping-bricks, there not being any cutting required at all, although such hardly appears to be the case at first glance, with an apparently complicated piece of work. The various dimensions figured upon the sketch are quite self-explanatory with regard to this point. A correct, star-shaped ornament can be further formed by cutting away to the dotted lines shown by the upper left-hand portion of this figure, or by cutting a brick diagonally, as shown in Fig. 19, and backing together the pieces so obtained. The latter method, though, involves considerable labor in cutting, not merely the points alone, but grounds as well, which also have to be considered.

Yet another position in which the moulded brick may very often be satisfactorily used—the formation of bosses—as illustrated by Fig. 20. It will be seen that these involve running a wider centre-band in the coursing, formed by bricks on edge, giving a 4½-in. face. The effect obtained, breaking up the uniformity of the coursing, forms a good variation towards the picturesque principles previously alluded to. A slightly more refined effect could be produced for some purposes by cutting down the moulded bricks to the ordinary 3-in. coursing width, if preferred, so as not to interfere with the regularity of the courses. The centre of the bosses may be easily fitted with a bat,

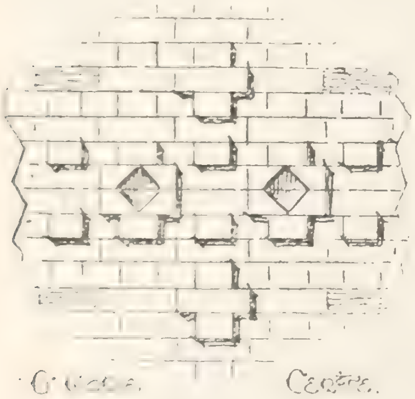


Fig. 15

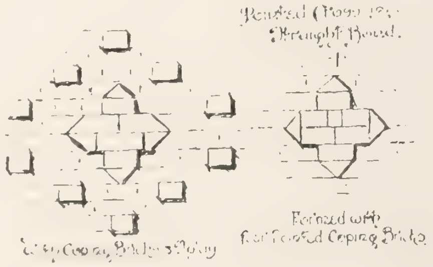

Pointed Cross in Straight Bond.
With Coping Bricks & Splay
Formed with Four Pointed Coping Bricks

Fig. 17

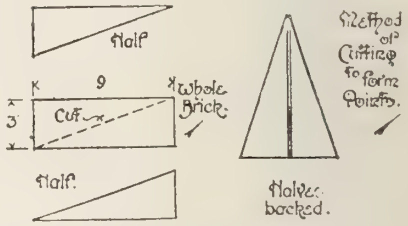


Fig. 19

either left plain, or with some slight carved relief, as indicated, introduced; such would not be an expensive item. Ornamental tile can also be set in the centre, if preferred, although the latter are usually of a somewhat too cast iron or ornate character. On this figure the boss set on the diagonal has the angles filled in with the triangular bricks previously described. The ends are shown with a small cut-out panel, throwing the centre into stronger relief; this might be alternated with plain ends. Beyond the bat required for centrepiece there would be no cutting necessary here again.

In the study of materials and their application it should be one of the first duties of the architect to find out what can be done with them. Utilizing such individual materials is an advanced manner for ornamental purposes, when the nature of the work, even if only by moderate financial possibilities, admits of so doing. Not to obtain cheap stereotyped ornamentation by means of, and the introduction of, other and foreign materials to that in which he may be primarily working for the time being.—Building News.

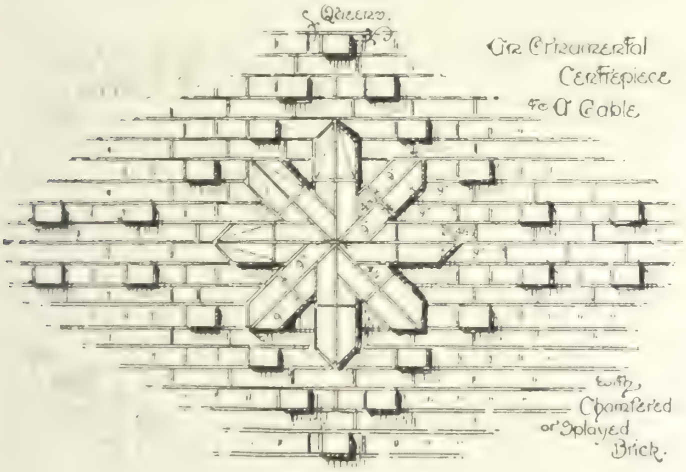

Quoins.
An Ornamental Centrepiece to a Gable
with Chamfered or Splayed Brick.

Fig. 18

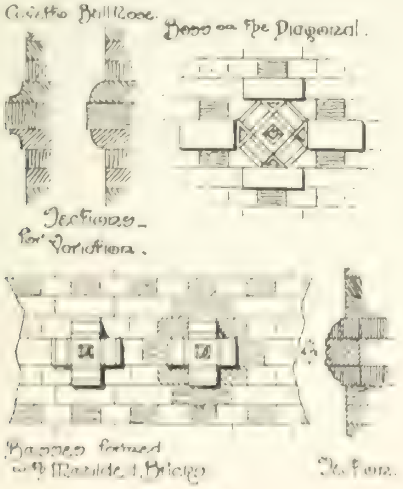


Fig. 20

According to Prof. Ira L. Baker, when alum and soap are used as waterproofing for concrete, the alum in powdered form may be mixed with the dry cement or the sand, and the soap may be dissolved in the water employed in mixing the concrete, or both the alum and the soap may be dissolved in the water. The former is probably the safer method in practice, since with the latter method the water must be thoroughly stirred while the two are being mixed, or the precipitate may form in large masses, which it is practically impossible to break up; and, further, the water must be kept stirred to prevent the compound from accumulating on the surface. However, the alum is more easily dissolved than the soap, and hence the alum may be dissolved in, say, one-fifth of the water, and the soap in the remaining four-fifths, and then the two portions may be mixed together. The alum and the soap combine and form a finely divided flocculent, insoluble, water-repelling compound which fills the pores of the concrete and decreases its permeability. The best proportions are:—Alum one part and hard soap two parts, both by weight. Soap varies in its chemical composition, and hence a single proportion cannot be stated which will be chemically exact for all cases. The above proportion is in round numbers the relative combining weights of alum and average hard soap. Any reasonably pure soap will do. It is difficult to dissolve more than 3 per cent. of hard soap in cold water, and hence this practically limits the amount of alum to 1.5 per cent. and of the soap 3 per cent.

The Origin of Stucco

We do not know how early in human history lime was discovered. It was very long ago, perhaps 6,000 years. No doubt some householder built fireplaces of limestone and saw them calcine before his eyes. The stone crumbled and turned into a white powder, afterwards becoming hard when water was applied. The addition of sand naturally followed to save expense, and the addition of sand was found to make a firmer and harder stone, and the mixture of lime and sand set much faster than the lime alone, when mixed with water into a mortar. Lime mortar was soon introduced into the interior of houses to form a base on which to decorate the walls. On the outside a small admixture of clay was found to enable it to better resist the action of the elements. Some man later found that when gypsum was calcined the result was what we know as "plaster of Paris," which was used to shorten the time of setting and make a harder plaster.

The addition of about fifty per cent. of ground brick-dust or clay to lime-paste made a hydraulic cement, one that would set under water. This discovery, made very early in the history of construction work, enabled men to erect important maritime works and cover houses with stucco which has lasted for centuries. The Romans mixed ashes from volcanoes in the vicinity of the village of Puzzuoli with lime and produced the famous "Roman cement," the secret of which was lost for nearly ten centuries, and the search for which led to the discovery of Portland cement. The use made of Roman cement in making stucco was well known, but as the centuries went on without Roman cement, the masons forgot that anything better than lime had ever been used for mortar, either for interior or exterior work, and houses plastered on the outside were erected for poor people in all countries. The plaster was not durable, and only in Italy, where many trade secrets were preserved among masons, did the stucco house persist. A century or so ago the use of plastered exterior came in again for houses of a good class, and plasterers and masons from Italy were employed. With the discovery of Portland cement the stucco house immediately became popular.—Ernest McCollough, in an Address before the North-Western Cement Products Association.

Laying Out and Planning Construction

With Special Reference to Street Work—Important Features in Successful Practice — Practical Methods of Procedure

By Daniel J. Hauer, in the Contractor, Chicago

"WHAT plan, Mr. Contractor, had you for carrying on this job?" asked an attorney in cross-examination recently of a contractor who was bringing an action against a city for being put off a contract.

"I did not make the plans; the engineers made those," replied the contractor.

"You do not understand, Mr. Contractor; I mean what layout you had planned,—the order of procedure you proposed to follow in carrying out this job?" asked the attorney.

"The same as any other contractor would have followed," replied the contractor.

Value of Proper Plans

Unfortunately, there are too many contracts started without being properly laid out or planned, following the precedent of other contractors, depending on circumstances to show what should be done and when, and relying on foremen and superintendents to do the proper thing. If such a procedure nets a profit, it is more by good luck than by good management.

On the other hand, there are contractors who lay out their work in great detail, carrying it on under a well-conceived plan, so that the work is not only done quickly, but at a low cost. This is the proper method. Time so spent, and even some extra money, will be repaid many times. To those who do not pursue this method, the results obtained are almost unbelievable. Some years ago the writer was bidding on a job upon which a fourteen months' time limit was asked. He suggested that the job be made a bonus and forfeit one, with a nine months' limit. This suggestion was adopted by the company and the contract awarded. The writer at once drew up a layout and plan of doing the work, including a schedule of time for each class of work and the different parts of the job. This included every detail, the camp, the plant, the purchasing and placing of all materials and the forces necessary to be employed from time to time. The schedule called for the work being done in seven and a half months, thus giving special leeway of six weeks' time. The writer expected that certain quantities of work would be increased and arrangements were made for such increases in the schedule. The anticipated increases occurred. Plans of various structures to be employed were drawn and placed in the hands of foremen to be used. The financial arrangements of the whole job were gone over and arranged for, the work being arranged in the schedule to earn the money as needed. After the work had been started some six or eight weeks the writer was called away to start another job, yet the contract was finished a week ahead of time and six days' bonus earned. In addition, the anticipated profit figured was made. Many contractors who knew of this job, and most of those who bid on it, said the work could not be done in nine months and that money would certainly be lost by a young man handling it on book knowledge.

It is quite difficult to give general directions on a subject of this kind that are applicable to all jobs, as many of the details must be known, and such details vary with each class of work and with each job. However, certain rules can be laid down and some directions followed on each job.

First, decide upon the financial arrangements. This should be based upon the amount of capital in hand, and the estimates than be earned on the job each month. First the money needed for payrolls must be considered, and other cash expenditures as freights, team hire and the small incidentals that are difficult to anticipate, but which can be estimated from accounts kept on other jobs. These include travelling expenses and other items. Of course, there are many for which cash is not absolutely needed, as credit can be obtained, but if all bills are discounted the money so earned on a fair-sized job is in itself a nice profit. This $1,000 used once a month to discount bills at 2 per cent. means the earning of $240 a year. This money cannot be saved if bills run to maturity. On one job the writer knew of $3,000 being made in less than a year in buying lumber and discounting all bills. Besides this, the prices obtained by getting competitive bids and offering cash were rock-bottom ones.

The old custom of paying labor but once a month can be followed to-day only on a few classes of work. On most jobs, especially in the towns and cities, payrolls must be met every two weeks and in most cases weekly. Thus, the contractor, being paid monthly, must arrange for about six weeks' payroll on the start, and after the first payment he must reserve cash for at least four weekly payrolls. These sums and other cash expenditures must be set aside and not be used for other purposes.

Economy in Purchasing Plant and Materials

Then the money needed for the necessary plant must be considered. If new plant need not be purchased, the contractor is that much better off. In some cases, either all or part of the plant must be bought or renewed. Machines of every kind can be rented, and there are times when renting is economical, as when a machine is needed for a short time only, or some special machine that is very expensive and the contractor would find difficult to sell it after finishing the job. Under most circumstances the writer does not believe in renting. It is evident that the owner cannot continue to buy and rent machines unless he makes a profit. He must charge such a price as to pay interest on the invesement, the cost of rebuilding from time to time; the cost of advertising and other overhead charges, sinking fund charges to buy a new machine, and a handsome profit. The contractor buying his own machine can certainly save himself some of these charges so that at the end of a year or two he is money in pocket.

Another method of obtaining plant is by lease sale agreement. This means that some actual cash must be spent, the rest being paid in monthly and quarterly payments. Interest is always charged on such payments, and sometimes the prices are made higher than they should be. Then, too, in some cases, the equipment, like in renting, is second-hand, which is seldom as satisfactory as new plant.

The cheapest way of buying plant is on open account, and if possible, to discount the bill. When this is done it is surprising at times how much the price is cut, especially if bought from an agent and not the manufacturer.

The next arrangement to make is for purchasing the materials needed in the work. If a price is paid for materials as they are delivered, then the proposition is made much easier, but if they are not paid for until placed, then arrangements should be made for enough credit to buy the materials in such quantities as not to delay the work. In the financial schedule the probable dates that certain sums of money will be needed should beset down, and, as an offset to these, the estimates to be earned each month should be listed. In this way the money needed from time to time will be known well in advance and arrangements can be made with banks or capitalists to furnish this money as needed, at the outset of the job, when the contractor is hard up and harassed to borrow when the contractor is hard up an harassed by creditors, when it is almost impossible to secure loans.

Laying Out Work to Advantage

In laying out the work the financial side should always be kept in mind. The work to be done should always be arranged so that the job is placed on a paying basis from the start. There is always a large amount of work to be done preparatory to setting the outfit and large forces to work, but as this is being done other work can be carried on that is earning money. It is seldom good business to spend thousands of dollars getting ready and at the same time not be earning estimates. The writer does not mean by this to start work before being ready and in a slipshod way, for to make money everything should be done in order and in a first-class manner.

Some years ago the writer started a new piece of railroad construction. He arrived on the ground at noon on Wedensday and at once arranged for the lumber needed for his camp, and a number of teams to start to haul the lumber and other things the next morning. Early the next day he started with some carpenters building camp, and by night had the kitchen built and one large building with the floor in and half the roof on. Several other shacks were started. Meantime, the kitchen stove had been hauled and set up, and some supplies of groceries, blankets and small tools had arrived. Towards evening the superintendent arrived with about twenty laborers. Supper was eaten in camp, the cook having arrived at noon that day, and the contractor, superintendent and men slept in shake-downs on the floor of the large shack with half the roof on. On that day and several others work was carried on from 5 o'clock in the morning untill 8 o'clock at night, using all the daylight in order to get things started. The next day under the superintendent a gang of men were started to work clearing right of way. Meantime, the carpenters continued on the camp, and by night shacks with bunks in them were fixed for the men, stores were set up, and the stable was started. More men arrived that evening with a foreman and work was started on the grade the next day. The horses and outfit arrived that day, were unloaded and put in their proper places. The next day the horses and mules were allowed to run loose to rest after their trip; it being Sunday, no work was done. On Monday the teams were put to work with increased forces of men, and most of the hired teams were discharged. The camp was still being built, but the job was under way and money had been earned from the second day. The work done during that part of the first month gave estimate enough to pay for the hired teams, the payroll and the small bills. The job was thus started promptly and quickly; the men learned to use the camp from the start, and the job was earning money from the second day. Contrast this with a job where a week or more was used to build a camp, no work done on the job, and the men compelled to shift for themselves to get lodging and food. At the end of the month no estimate has been earned and a large payroll has to be met.

For buildings and other structures, plans should be made, and too much should not be left to the judgment of foremen and men. It is often well to make plans of layout on the ground, so that machines are installed to be served and do their work in the most economical manner.

Bills of material should be secured as early as possible and schedules arranged so that they can be purchased for the lowest price and for prompt delivery. Material bills as made up by engineers and architects are for completed structure, and not with any idea of purchasing them cheaply. A rearrangement may not only mean the saving of much money, but also of time that in itself may mean the saving of money. Prices from a number of dealers or manufacturers should always be obtained and their facilities for furnishing the material investigated. On large and important jobs it is sometimes necessary to visit factories, quarries, timber land and other sources of supplies to see if a concern naming a lower price can make the proper deliveries.

Time Schedule

The time schedule made out for a job should include the delivery of materials and at the points needed, the outfit and forces and how they must be increased and their disposition as they become idle. As the job progresses a diary should be kept and notes made on the schedule so as to show where and why it was not lived up to. This is a great help in mapping out another job.

Many contractors in the east make their start at contracting on either concrete or street and road construction. On street work the chances for loss are great, so that it is only by careful planning that jobs can be handled to show a profit. For this reason the writer will map out how he would start a job of paving a street with bricks on a concrete base, and putting in a concrete curb in place of an old.

Upon being awarded the contract, the first thing to do would be to make out a list of all the work to be done, with the quantities of material, as brick, crushed stone, sand, cement, steel, filler, forms, etc., and the amount needed in each square or block on the street. Also the plant needed. With this information, prices and deliveries on everything could be obtained and a time schedule made up for the work, showing where the work was to be started, the forces to be employed from start to finish, the teams needed and the length of haul for each block. The time to start and finish each section, the amount of work to be done each week, from which the estimate to be earned could be figured, the probable payroll and expense account estimated and every other detail.

As this was being done, all of which should be done within a week, the outfit could be placed on the job and the first materials delivered. Thus within ten days the forces could be placed on the work and the job commenced. With all this information the financial arrangements for the entire job could be arranged by the time work was begun or shortly after.

By such a schedule, made out in detail, almost any clerk, timekeeper or foreman could see to it that the material was placed on the job so there would not be a shortage in any section nor more than was needed, so that rehandling would not be necessary. The wasting of materials and rehandling eat up much profit on many jobs. A contract cannot be handled economically unless the man in charge is familiar with every detail of the quantities, both of the work to be done and materials to be furnished. It is well to have these in one's memory, but memory should not be relied upon; they should be set down for easy reference.

If the street can be closed for traffic the job is easier to handle, but in many cases only one side of the street can be closed up. Then begin by tearing out the curb on one side, and as soon as a stretch of a hundred feet or more is torn out and the excavation made, begin to place the new curb.

Two kinds of concrete plants can be installed. A central plant, where all the mixing is done and the concrete hauled from the mixer to the place of deposit, or a street mixer that is moved along either by its own power or by power applied to it, the mixer depositing the concrete directly in place. Wheelbarrows or buggies are sometimes used to carry the concrete from the mixers, but machines can be installed that deposit the concrete in place. When the materials can be unloaded from freight cars into bins and the mixer placed there, then a central plant is to be preferred, but when the raw materials have to be hauled the preference is for a street mixer.

With the curb forms ready, the concrete can be placed at once and the old pavement can be ripped up opposite the new curb. This should be followed by the grading gang, and, as their work is finished, the mixer and concrete men can be brought back to lay the concrete base. When this has set, paving can be started. This can all be done according to a schedule.

When the paving is once started, then everything should be so arranged and the various forces numbered so that the curb tearing out and placing is kept ahead of the old paving tearing up and the grading, this work kept ahead of laying the concrete base, and the paving work to go on continuously, with the cleaning up being done behind the pavers.

The pavers are the highest salaried men, so that their work should not be interrupted, as delays for them quickly mean loss of money. If the proper number of men are put on each class of work they will become accustomed to it quickly and soon do it with dispatch and economy.

Distribution of Forces

The forces should be kept as close together as possible and yet should not be in one another's way. Work stretched over a large area is difficult to handle, materials and tools become lost, and the cost of doing the work is increased. Try to work along continuously, that the outfit and forces will not have to be moved often. For that reason, if a street or a part of it can be closed to traffic, the whole width can be done at one time. In one block the curb work can be done and the tearing up and grading, while the concrete base and paving can be laid in the block behind it, while the finishing and cleaning up is being done in a third block.

If only half the street can be worked upon at one time, keep on one side until it is finished, then work back on the other side. Finish cross streets as the other work is done. See that proper provision is made for water in the gutters, as nothing affects paving work as water. Keep your work dry.

If other parties have to fix pipes, sewers, conduits and similar things ahead of your work, make it your business to see that it is done promptly or else you will be delayed and your entire job upset. It may be unpleasant to make other people "toe the mark," but the contractor is the one who will have to pay the cost of delays, and if a contractor gets a reputation in a community that he will not stand for trifling and such delays, he will find that the other parties will do their work more promptly and he will be respected more. An easy-going man will find that other people will do as they please with him, and he will pay the bills.

These are the essential points to cover in planning your work. If this is done from the start you will boss the job, if not, the job is more than likely to boss you.

Flat Slab Bridges

THE adaptability of the flat-slab form of reinforced concrete construction, to railroad culverts and bridges of comparatively small spans, was recently discussed by Mr. W. H. Finley, Assistant Chief Engineer, Chicago North-Western Railway Company, in a paper presented before the Eighth Annual Convention of the National Association of Cement Users. The following notes are taken from this paper.

Mr. Finley states that since the introduction of concrete for the construction of railroad bridges no type of structure has met with more success than the flat-slab bridge. In the days of stone masonry it was necessary to use the flat top culvert for openings up to 4 or 5-ft. spans, and beyond that the arch type was required. This meant increased expense in construction due to the cost of the cutting of the masonry for the arches. For years after the introduction of concrete it was a common practice to use, for small openings up to 8 or 9 ft., old railroad rails embedded in concrete to form the top covering. In those days there was more or less second-hand rail that could be used economically for this purpose, and it was thought that in using the material in this way a cheap and satisfactory structure could be produced. It was soon discovered, however, that second-hand rails were not always available, and if available they could be put to better use than burying them in concrete for culvert construction.

Spans Under Thirty Feet

In spans greater than 9 ft. and up to 30 ft. it was the practice, for a number of years, to use I beams embedded in concrete. Among some engineers the idea was to use beams of sufficient strength to carry the live load and consider the concrete only as taking the place of lateral bracing. According to Mr. Finley, this form of construction required very careful work in the field on account of the difficulty of making a satisfactory bond between concrete and large areas of metal, as represented by an I beam, even with the greatest care in the selection of the material and the placing of the concrete. Although there were a number of satisfactory bridges built of this type, yet it was gradually abandoned, and as confidence grew in reinforced concrete these smaller openings were built of the reinforced flat slab type. He further states that this type not only took the place of stone arches of corresponding span, but also at a much less price, and thus enabled engineers to satisfactorily solve problems in places where a wide and low opening was particularly desirable. The ideal structure from a railroad standpoint of use is that type that entails the least cost in maintenance. Stone masonry, however carefully constructed, required from time to time repointing to prevent the infiltration of water and consequent disintegration of the structure. With concrete properly constructed this maintenance charge is completely eliminated and the first cost of construction is considerably reduced. In the building of a flat slab bridge as a monolith it is possible to use less material in the side walls than would be required for an arch of corresponding spans.

Mr. Finley notes that in recent years the flat slab bridge has been used to good advantage in cities where the railroads were eliminating grade crossings by the elevation of their tracks. In the ordinary 66-ft. street, where the city permits supports in the centre of the street and on the curb lines, it is possible to use the flat slab type of bridge for spanning these openings. This results in a very economical form of construction as well as one that can be made aesthetically pleasing in general appearance. It also reduces to a minimum any maintenance expense. A steel structure for a similar opening requires painting every four or five years, and if this work is not attended to the structure soon presents an unsightly appearance. This condition is very noticeable in our elevated railroads in cities where the maintenance is not kept up.

Replacing I-Beam Spans

In railroad construction, twenty years ago, it was the universal practice to use open deck I beams for spans of from 6 to 30 feet. These were usually placed upon concrete or stone masonry abutments and presented as much difficulty in maintaining good track as much larger spans, for the reason that the dump ties were just as troublesome to keep up as the same ties on a 150-ft. span. In the opinion of Mr. Finley, it is usually possible to remove these I beams and replace them with flat slab bridges, carrying the ballast across the bridge and making a uniform track surface. The I beams can be used for other purposes or they have at least a salvage value that goes toward reducing the cost of the improvement. He notes a certain stretch of railroad of about 36 miles that has over twenty small openings of from 6 to 25 ft. span made up of I beams with open floors. However carefully the track work was kept up over this section it meant a bad riding track, as each one of the bridges represented an unyielding space that was very noticeable to the travelling public.

In summing up, Mr. Finley states that there is no class of reinforced concrete construction that is entitled to more careful and intelligent supervision in the construction than flat slab bridges. When concrete began to displace stone masonry unfortunately the sole idea of constructing engineers was to see how cheaply they could build structures in concrete. Apparently many engineers were so anxious to prove the superiority of concrete in both cost and durability that they frequently sacrificed the latter for the former. It is generally recognized to-day that to produce satisfactory concrete construction it is necessary to use the utmost intelligence and care in the selection of the materials and the execution of the work.

Tests of Reinforced Concrete Columns

Square-cored helically-wound columns of reinforced concrete have been tested at the University of Wisconsin by Messrs. F. W. Ullius, H. E. Pulver and L. E. Dequine in order to ascertain how their strength compares with that of cylindrical columns with bands around the vertical rods. All columns were 7½ feet long, of 1:2:4 rather soft limestone concrete, and tested when two months old. Ovoid bars of 0.935 sq. in. area and 50,000 lb. yield point per square inch were used for the vertical reinforcement. The helical steel had a yield point of 87,000 lb. There was only a thin shell of concrete outside the reinforcement. Four columns were 8¼ in. in diameter, each with four vertical rods and helical winding. Four were 10 x 10 in., each with helical winding on its four vertical bars, and four of the same size had the vertical bars banded. The results of the tests show that, if one of the cylindrical columns is left out of consideration, the average ultimate strength of the cylindrical columns was 4,459 lb. per square inch, that of the square columns, with helical winding was 3,879 lb., and that of the square columns with ordinary tying was 2,880 lb. It seems evident, therefore, says The Engineering Record, that the strength of a square column with its vertical reinforcement wrapped is somewhat greater than the strength when the vertical reinforcement is banded at intervals about equal to the thickness of the column. But the most important lesson of the tests is to be learned from the fourth cylindrical column, rejected in obtaining the average results just mentioned, which developed an ultimate strength of only 2,375 lb. Here was a column made for test purposes instead of in the field by unskilled laborers under a busy foreman unable to watch every detail of the work. Yet it developed only half the usual strength of such columns, and if it were part of the building its safety factor would be only 2.3 instead of 4.5, the average of the three good columns. Such evidence of the necessity of great care in reinforced concrete is too clear to be left unnoticed.

Razing high chimneys is accomplished in certain parts of England by first replacing the stones or brick over a section of the base by wooden underpinning. About two-thirds of the base area is thus removed up to a height of from 5 to 6 feet, and subsequently the wooden underpinning is set on fire. Experience has shown that there is a slight leaning of the chimney towards the underpinned side, and as soon as a crack appears in the masonry on the opposite side the fire is applied. As the chimney falls it partially telescopes, due to the shock produced by dropping into the void left by the burned timbers.

Roots in sewer-pipe joints have been investigated by the Commission on Beautifying the City of Norfolk, Va., whose secretary, Mr. H. N. Castle, states that the manager of a large local contracting firm engaged on public works has found the following treatment efficacious in preventing the trouble: After the pipe joints are filled with cement mixed in the usual manner but before it has set, coarse salt should be applied to the outside freely, so it will become imbedded in the wet mortar surface. When the cement has set, the salt will remain in the form of crystals, which will keep roots from penetrating the joints to reach the damp interior of the sewer.

Specifications for Portland Cement Sidewalks

WHAT is regarded as the most satisfactory code for concrete sidewalk construction is that which was presented for consideration at the last annual convention of the National Association of Cement Users. The terms of the specifications, which are given below, are comprehensive and are adapted to meet the varying requirements of local conditions:

1. Cement. The cement shall meet the requirements of the Standard Specifications for Portland Cement of the American Society for Testing Materials and adopted by this Association. (Standard No. 1).

2. Fine Aggregate. Fine aggregate shall consist of sand, crushed stone or gravel screenings, graded from fine to coarse, and passing when dry a screen having ¼-inch diameter holes; shall be preferably of silicious material, clean, coarse, free from dust, soft particles, loam, vegetable or other deleterious matter, and not more that 3 per cent. shall pass a sieve having 100 meshes per lineal inch. Fine aggregate shall be of such quality that mortar composed of one part Portland cement and three parts fine aggregate by weight, when made into briquettes, will show a tensile strength at least equal to the strength of 1:3 mortar of the same consistency, made with the same cement and Standard Ottawa sand. In no case shall fine aggregate containing frost or lumps of frozen material be used.

3. Coarse Aggregate. Coarse aggregate shall consist of inert materials, such as crushed stone or gravel, graded in size, retained on a screen having ¼-inch diameter holes; shall be clean, hard and durable; free from dust, vegetable or other deleterious matter, and shall contain no soft, flat or elongated particles. In no case shall coarse aggregate containing frost or lumps of frozen material be used. The maximum size of coarse aggregate shall be of such size as to pass a 1¼-inch ring.

4. Natural Mixed Aggregates. Natural mixed aggregates shall not be used as they come from the deposit, but shall be screened and remixed, to agree with the proportions specified.

5. Sub-Base.* Only clean, hard, suitable material, not exceeding 4 inches in the largest dimension shall be used.

When a sub-base is not required, eliminate paragraphs 5 and 10 (a).

Unless paragraph 10 (a) is eliminated, 10 (b) is void.

6. Water. Water shall be clean, free from oil, acid, alkali or vegetable matter.

7. Coloring. If artificial coloring material is required, only mineral colors shall be used.

8. Reinforcing Metal. The reinforcing metal shall meet the requirements of the Standard Specifications for Steel Reinforcement adopted March 16, 1910, by the American Railway Engineering Association.

Sub-Grade

9. Slope. The sub-grade shall have a slope toward the curb of not less than ½-inch per foot.

10. Depth. (a) The sub-grade shall not be less than 11 inches below the finished surface of the walk.

(b) The sub-grade shall not be less than 5 inches below the finished surface of the walk.

11. Preparation. All soft and spongy places shall be removed, and all depressions filled with suitable material, which shall be thoroughly compacted in layers not exceeding 6 inches in thickness.

12. Deep Fills. When a fill exceeding 1 foot in thickness is required to bring the work to grade, it shall be made in a manner satisfactory to the engineer. The top of all fills shall extend beyond the walk on each side at least 1 foot, and the sides have a slope not greater than 1 on 1½.

13. Drainage. When required, a suitable drainage system shall be installed and connected with sewers or other drains indicated by the engineer.

Sub-Base

14. Width—Thickness. On the sub-grade shall be spread a suitable material, as hereinbefore stated, which shall be thoroughly rolled or tamped to a surface at least 5 inches below the finished grade of the walk. On the fills the sub-base shall extend the full width of the fill, and the sides shall have the same slope as the sides of the fill.

15. Wetting. While compacting the sub-base, the material shall be kept thoroughly wet and shall be in that condition when the concrete is deposited.

Forms

16. Materials. Forms shall be free from warp and of sufficient strength to resist springing out of shape.

17. Setting. The forms shall be well staked or otherwise held to the established lines, and grades and their upper edges shall conform to the established grade of the walk.

18. Treatment. All wood forms shall be thoroughly wetted, and metal forms oiled before depositing any material against them. All mortar and dirt shall be removed from forms that have been previously used.

Construction

19. Size of Slabs. The slabs or independently divided blocks, when not reinforced, shall have an area of not more than 36 square feet, and shall not have any dimension greater than 6 feet. Larger slabs shall be reinforced as heinafter specified.

20. Thickness of Walk. The thickness of the walks should not be less than 5 inches for residence districts, and not less than 6 inches for business districts.

21. Width and Location of Joints. A ½-inch expansion joint shall be provided at least once in every 50 feet.

22. Joint Filler. The expansion joint filler shall be a suitable elastic waterproof compound that will not become soft and run out in hot weather, nor hard and brittle, and chip out in cold weather.

23. Protection of Edges. Unless protected by metal, the upper edges of the concrete shall be rounded to a radius of ½-inch.

Measuring and Mixing

24. Measuring. The method of measuring the materials for the concrete, including water, shall be one which will insure separate uniform proportions at all times. A sack of Portland cement (94 pounds net) shall be considered 1 cubic foot.

25. Machine Mixing. When the conditions will permit, a machine mixer of the type that insures the uniform proportioning of the materials throughout the mass, shall be used. The ingredients of the concrete or mortar shall be mixed to the desired consistency, and the mixing shall continue until the cement is uniformly distributed and the mass is uniform in color and homogeneousness.

26 Hand Mixing. When it is necessary to mix by hand the materials shall be mixed dry on a water-tight platform until the mixture is of uniform color, the required amount of water added and the mixing continued until the mass is uniform in color and homogeneousness.

27. Retempering. Retempering, that is, remixing mortar or concrete that has partially hardened with additional water, will not be permitted.

TWO-COURSE WALKS

Base

28. Proportions. The concrete shall be mixed in the proportion of 1 sack of Portland cement, 2½-cubic feet fine aggregate, and 5 cubic feet coarse aggregate.

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*NOTE—When a sub-base is required, eliminate paragraph 10 (b).

29. Consistency. The materials shall be mixed wet enough to produce a concrete of a consistency that will flush readily under slight tamping, but which can be handled without causing a separation of the coarse aggregate from the mortar.

30. Placing. After mixing, the concrete shall be handled rapidly, and the successive batches deposited in a continuous operation, completing individual sections. Under no circumstances shall concrete be used that has partially hardened. The forms shall be filled and the concrete struck off and tamped to a surface the thickness of the wearing course below the established grade of the walk. After the concrete has been thoroughly tamped against the cross forms, they shall be removed, and the material for the adjoining slab deposited; so as to preserve the joint. Workmen shall not be permitted to walk on the freshly laid concrete, and if sand or dust collects on the base, it shall be carefully removed before the wearing course is applied.

31. Reinforcing. Slabs having an area of more than 36 square feet, or having any dimension greater than 6 feet, shall be reinforced with wire fabric or with plain or deformed bars. The cross sectional area of metal shall amount to at least 0.041 square inches per lineal foot. The reinforcing metal shall be placed upon and slightly pressed into the concrete base immediately after the base is placed. Reinforcing metal shall not cross joints and shall be lapped sufficiently to develop the strength of the metal.

Wearing Course

32. Proportions. The mortar shall be mixed in the manner hereinbefore specified in the proportion of 1 sack Portland cement, and not more than 2 cubic feet of fine aggregate.

33. Consistency. The mortar shall be of a consistency that will not require tamping, but which can be easily spread into position.

34. Thickness. The wearing course of the walk in residence districts shall have a minimum thickness of ¾ of an inch, and in a business district a minimum thickness of 1 inch.

35. Placing. The wearing course shall be placed immediately after mixing and in no case shall more than 50 minutes elapse between the time the concrete for the base is mixed and the time the wearing course is placed.

36. Finishing. After the wearing course has been brought to the established grade, it shall be worked with a wood float in a manner that will thoroughly compact it. When required, the surface shall be trowelled smooth, but excessive working with a steel trowel shall be avoided. The slab markings shall be made in the wearing course directly over the joints in the base with a tool which will completely separate the wearing course of adjacent slabs. If excessive moisture occurs on the surface, it must be taken up with a rag or mop, and in no case shall dry cement or a mixture of dry cement and sand be used to absorb this moisture or to hasten the hardening. Unless protected by metal, the surface edges of all slabs shall be rounded to a radius of about one-half inch.

37. Coloring. If artificial coloring is used, it must be incorporated with the entire wearing course and shall be mixed dry with the cement and aggregate until the mixture is of uniform color. In no case shall the amount of coloring used exceed 5 per cent. of the weight of the cement.

ONE-COURSE WALK

The general requirement of the Specifications covering two-course work will apply to one-course work, with the following exceptions:

38. Proportions. The concrete shall be mixed in the proportion of 1 sack Portland cement to 1½ cubic foot of fine aggregate and 3 cubic feet of coarse aggregate, passing a 1-inch ring.

39. Placing and Fnishing. The form shall be filled, the concrete struck off and the coarse particles forced back from the surface, and the work finished in the usual way.

40. Reinforcing. When a single course walk is to be reinforced, the metal shall be placed 2 inches from the finished surface. The minimum amount of metal shall be as specified in paragraph 31.

Protection

41. Treatment. When completed, the work shall be kept moist and protected from traffic and the elements for at least three days, and shall not be opened to traffic until the engineer so directs.

42. Temperature Below 35° F. If at any time during the progress of the work the temperature is, or in the opinion of the engineer will within 24 hours drop to 35° Fahrenheit, the water and aggregates shall be heated and precautions taken to protect the work from freezing for at least 5 days. In no case shall concrete be deposited upon a frozen sub-grade or sub-base.

Are Substitutes Displacing Lumber?

THERE is an impression abroad that cement and steel construction is gradually replacing the use of timber and that for this reason the manufacturers of lumber will sooner or later be hard put to dispose of their products. This impression is bolstered up by such statements as the following, delivered before the National Hardwood Manufacturers' Convention at Cincinnati on Jan. 31. "The Long-Bell Lumber Company has about one hundred and fifty retail yards. They are very large manufacturers of lumber. They do not manufacture cement. In 1905 they sold one carload of cement to sixteen carloads of lumber; in 1906 they sold one carload of cement to six carloads of lumber; in 1909 they sold one carload of cement to five carloads of lumber; in 1910 they sold one carload of cement to four and a half carloads of lumber; in 1911 they sold one carload of cement to three and one tenth carloads of lumber." This statement shows that in the territory covered by the 150 Long-Bell retail lumber yards the sale of cement has increased five times more rapidly than the sale of lumber. But it does not show that the quality of lumber sold has decreased, or even that the annual per capita consumption of lumber has decreased.

Similarly those who argue for the increased use of cement for sidewalks, foundations, factories and residences and the increased use of metal for doors, interior trim and office fittings, that the market for lumber is becoming yearly narrower are only giving one half the argument. They do not state that the standards of living are increasing, that the requirements of each individual are yearly becoming greater, and that the increase in the use of manufactured articles, improvement in the size and standards of building and furnishing, more than makes up for the displacement of lumber by other materials. So rapidly are our ideas changing as to what we require to make us comfortable that our annual per capita consumption of wood is increasing. This may best be shown by a study of the use of wood in Great Britain, where nearly all the wood is imported, and where consequently close account has been kept of all the wood used and the use of wood has been as economical as possible. Great Britain is the home of cement, stone and brick construction, and produces all metal and steel goods cheaply, yet the annual per capita consumption of wood has increased steadily during the last few years.

So firmly do the manufacturers of hardwoods in the United States believe that the heavy advertising campaigns conducted by the manufacturers of cement, steel furniture, inside trim, doors and sash, have resulted in a decreased use of wood that they are raising an advertising fund of $100,000 to be used in improving the market for hardwoods. This appears to be a peculiar step in view of the fact that the United States Forest Service has during the past five years repeatedly made the statement that the high grade hardwoods of the United States will only last another 15 or 20 years at the present rate of cutting. The U. S. census returns show that the rate of production of the high grade hardwoods has steadily increased since that prophecy was made. Thus the strange spectacle is presented, of the United States government on one hand spending millions of dollars in buying up and managing hardwood lands, to prevent the high grade timber from becoming extinct, and of the hardwood manufacturers on the other hand undertaking a policy of national advertising which will increase the use of high grades but which will not increase the use of low grades.

It is not likely that special advertising will be necessary to help market Canadian lumber, unless it were a well directed campaign to show that Canadian species are quite as satisfactory, and in some respects to be preferred to southern yellow pine. There is every prospect that the Canadian lumberman, east of the Rockies at least, will always be able to sell all he can cut. Just as the cut of the more valuable timbers, pine and the hardwoods, begins to decrease, as it surely is decreasing now through the exhaustion of the forests, the increased prosperity of the people is bringing about a greater per capita demand for these timbers, and the increased population is adding another demand. These two demands, the demand of wealthier Canadians and the demand of new Canadians, will, year in and year out, always take all the lumberman can produce. At present the greater part of the Canadian demand for hardwoods is met by the importation of United States wood. The demand for pine is met by using spruce and an increasing proportion of the cedar used in Canada is secured in the United States.

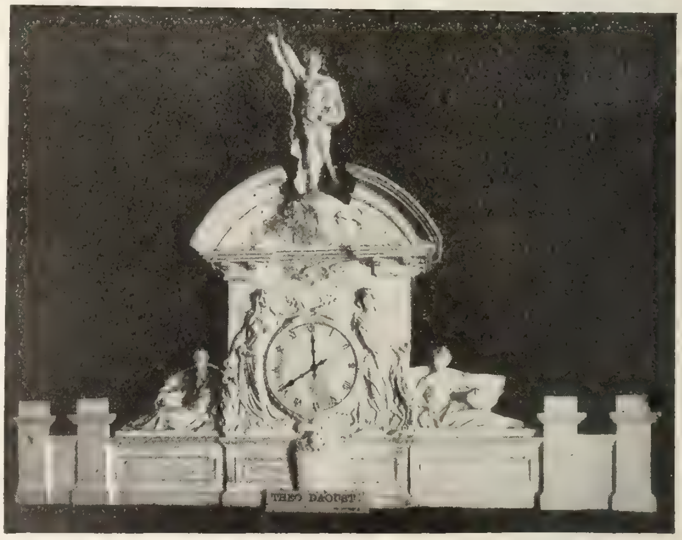
A Noteworthy Investigation

It is interesting to note that an investigation was conducted in the central states a few months ago to learn the extent to which substitutes were replacing wood in common uses and it was learned that, so far as could be judged by the 1200 retailers and builders reporting, the total substitution amounted to only 5 per cent. It is easy to understand that the increased standard of living would make up for this loss of 5 per cent.

During the last three years it is estimated that substitutes have replaced wood to the extent of 9 per cent. for interior finish. For lath the substitution has reached 3 per cent., due to the use of expanded metal lath. Other materials have displaced 2.4 per cent. of the wood formerly used for sheathing. Metal and cement posts are now occupying 3.7 per cent. of the space formerly occupied by wooden posts. Tin and sheet metal sidings cover 4.1 per cent. of our buildings to the exclusion of wooden sidings. For general purposes substitutes are used to the extent of 5.3 per cent. in place of lumber. Reinforced concrete, brick and structural iron have taken up 5.4 per cent. of the trade formerly given over to dimension timber. Concrete flooring has increased rapidly. It supplies yearly 6 per cent. of the area laid. The day of the wooden picket is waning, wire fences, ornamental iron, etc., now displace 9 per cent. of the wooden pickets. In farm fences the change is greater; 13.7 per cent. of such fences are now of materials other than wood. As the substitutes are displacing rails the lumberman need not worry. The greatest change is in shingles. About 16.2 per cent. of the roofs are now covered with substitutes for wood.

Montreal General Post Office

Work is in full operation on the reconstruction of the Montreal General Post Office. The cut shows a full sized model of the frontal, which was planned and made under the direction of Mr. Theo. Daoust, the architect; the model has been carved by Mr. Louis H. Hubert, and the contract let to Mr. William Dawson, of Montreal. The frontal is to be of stone.



Model of Frontal for Montreal General Post Office

It contains several allegorical figures: on one side is the St. Lawrence, represented by a Canadian type, and on the other the Ottawa, represented by a Canadian girl. The clock in the centre is surrounded by two half-reliefs symbolical of Upper Canada, with its grains, and Lower Canada with its fisheries, and over these are two pigeons to represent the first messengers of the post office. The face of the clock is six feet in diameter. It rests on a beaver and is covered with maple leaves. Over the whole is a statue in stone 15 feet high, representing Mercury, the god of Commerce, standing on the globe. On the balustrade of the frontal is a shield bearing the Dominion arms with palm leaves on both sides of the shield.

The underpinning of the unstable foundations of a steel stack erected in 1910 in the new mill building of the Union Rolling Mills Company at Cleveland, Ohio, was accomplished by driving reinforced concrete piles to shale on two sides of the foundation, transferring the weight to I-beams, and then constructing a concrete slab under the whole foundation to prevent firing the inflammable material in to filled ground under the stack.

Toronto's Tribute to City Engineer Rust

Eulogistic Utterances by Prominent Engineers and Public Officials Universal Appreciation of a Long and Honorable Record

On the evening of Friday, May 10th, a farewell dinner was given to Mr. Charles H. Rust by The Engineers' Club of Toronto. The attendance numbered nearly one hundred and the meeting was perhaps one of the most representative of the kind ever held in Canada, including as it did not only many of the most eminent engineers in the various branches of the profession, but also men occupying high positions in public and industrial life and others prominently identified with engineering interests.

The occasion was an unique one, Mr. Rust having served the city for no less than thirty-five years, during the last fourteen of which he has been City Engineer. The gathering was convened as a tribute to his worth and to wish him success at Victoria, B. C., in which city he has accepted a similar appointment.

The complete list of those present is as follows:

Mr. K. L. Aitken, Mr. J. J. Ashworth, Mr. C. Allen, Dr. J. S. Back, Mr. Frank Barber, Mr. W. Barber, Mr. E. H. Beck, Mr. Eustace E. Bird, Mr. Wm. B. Boyd, Mr. J. E. Bremner, Mr. W. A. Bucke, Mr. R. T. Coady, Ald. Chisholm, Mr. C. M. Canniff, Mr. Willis Chipman, Mr. R. Cumming, Mr. E. L. Cousins, Mr. Frank Chappell (Oshawa, Ont.), Mr. G. W. N. Day, Mr. W. E. Douglas, Mr. H. L. Drayton, Mr. W. J. Evans, Mr. H. Foreman, His Worship Mayor Geary, Dr. Jno. Galbraith, Mr. F. A. Gabey, Mr. Stewart L. Gibson, Mr. Chas. Goad, Mr. A. B. Garrow, Dr. Hastings, Professor H. E. T. Haultain, Mr. A. L. Hertzberg, Mr. C. H. Heys, Mr. Wm. Inglis, Mr. T. C. Irving, Jr., Mr. E. A. James, Mr. Parker H. Kemble, Mr. Robt. W. King, Mr. Gordon Logan, Mr. F. F. Longley, Mr. Lewis, Mr. A. E. Macallum (Hamilton), Mr. Geo. H. Magalhaes, Mr. A. J. Mitchell, Mr. G. A. Mitchell, Mr. L. W. Mitchell, Mr. A. L. Mudge, Mr. Jas. McEvoy, Mr. W. A. McLean, Mr. Harry McMaster, Major Hugh C. MacLean, Mr. Frederic Nicholls, Mr. A. A. Neighorn, Mr. R. F. Pack, Mr. G. G. Powell, Mr. C. W. Power, Mr. Joseph Race, Mr. A. W. S. Roberts, Mr. C. H. Rust, Mr. F. S. Spence, Mr. J. J. Salmond, Mr. Angus Sinclair, Mr. J. G. Sing, Mr. P. W. Sothman, Mr. F. B. Speight, Mr. M. A. Stewart, Mr. Allen Sullivan, Mr. A. F. Stewart, Mr. W. F. Trethewey, Mr. Geo. W. Watts, Mr. H. N. Wicksteed, Mr. J. J. Wright, Mr. W. F. Wright, Mr. J. F. Wyse, Mr. A. J. Van Nostrand, and Mr. T. S. Young

Mr. Willis Chipman in the Chair

The chairman of the evening was the President of the Club, Mr. Willis Chipman, who, at the outset, announced the receipt of letters from Mr. Geo. A. Mountain, Mr. W. F. Tye, Mr. Edmund Burke, Mr. E. H. Keating and others, expressing regret at their absence. In the case of Messrs. Burke and Keating this was occasioned by illness.

After the toast of "The King" had been loyally honored, the chairman called upon Mr. J. G. Sing, District Engineer, Department of Public Works for Canada, to propose "Our Guest." Mr. Chipman, himself, gave some interesting reminiscences of his early life and told how Mr. Rust and he had started professional life together—Mr. Rust in the Sewers Department and he (Mr. Chipman) in the Waterworks Department.

Mr. J. G. Sing paid tribute to the efficient manner in which the City Engineer had fulfilled the arduous duties of his office during a period in which Toronto had grown from a city of 175,000 to one of 400,000. Mr. Rust had held his post eight years longer than any previous engineer. He was the possessor of outstanding ability and it was to be regretted that he, in common with all other municipal engineers, had always found it necessary to be on the defensive. Mr. Sing deplored this condition imposed by city councils. It was not so in other professions: doctors lost patients, and lawyers cases, and nobody heard anything more of it. A mistake in an engineer's calculations was fatal. If an engineer put a weak member in a bridge and the structure collapsed, the engineer went down with it. There was no reflection, however, upon Mr. Rust's ability and he was leaving Toronto with the esteem of the best element of the city. "No man," said Mr. Sing, "ever left with better credentials."

Opposition from "Ignorant Politicans"

Ex-Controller F. S. Spence said that Mr. Rust was to be commended for having done his duty in face of the most trying opposition from "ignorant politicians." The present-day municipal engineer required "the wisdom of Solomon, the courage of David, the meekness of Moses, the patience of Job, the executive ability of a Napoleon Bonaparte and the administrative skill of a G. R. Geary." Mr. Spence humorously touched upon various types of city councillors, enlarging somewhat upon the ignorant type of man who felt qualified to pass opinions upon engineering work without having any knowledge of its first principles. The man of this type resembled the boy who defined a watershed as a "shed in which water was kept," and a blizzard as "the inside of a hen." In parting with Mr. Rust the city was sustaining an irreparable loss. The City Engineer was a man of wonderful perseverance, and his knowledge of local conditions was so intimate that his value to the city was above price. The mistakes that had occurred would never have been made if Mr. Rust's advice had been followed—as an instance of which Mr. Spence cited the recommendations concerning the water supply given years ago by Mr. Rust and which only now, after much argument and delay, were being carried out in every particular. The speaker closed with a tribute to Mr. Rust's sterling honesty.

A high encomium upon the work of Mr. Rust was passed by Mayor Geary, who praised the efficient manner in which he had discharged the responsible duty of supervising the expenditure of $25,000,000 for the city. Many great undertakings would remain as a permanent memorial to his ability. As an engineer he left nothing to be desired and as a man he was universally esteemed. At the City Hall there was a general sense of personal loss at his leaving. Mr. Rust was a man whom they were all "proud, pleased and honored to call a friend."

Mr. Rust Receives Great Ovation

Mr. Rust, upon rising to speak, was greeted with prolonged cheers and was accorded musical honors. The occasion was the emotional moment of the evening. Mr. Rust expressed regret at leaving all his friends. His connection with the city had been a long me and there was a wrench in parting. The speaker made a passing reference to the criticisms which had been deplored so much by the speakers who had preceded him. "Criticism is all right," said Mr. Rust, 'so long as it is constructive. But this destructive criticism is wrong; it effects no good purpose and it is unfair to the engineer in that it injures his reputation in outside quarters." Mr. Rust pleaded that his successors in office might be accorded better treatment in this regard and concluded with an acknowledgment of the loyal support that he had received from the members of his staff.

Alderman Chisholm dwelt upon Mr. Rust's various achievements and referred in particular to the public tribute that had been made that morning by Judge Winchester, who had found the occasion opportune to remark the total absence of scandal of any kind in connection with his many years of administration of the Works Department, in spite of long and searching investigations, and to congratulate Mr. Rust on his record. The remarks made by Mr. L. H. Drayton, K.C., Corporation Counsel, who followed Alderman Chisholm, were of the same tenor.

Dr. Hastings, Medical Health Officer, spoke of his extended acquaintance with Mr. Rust and referred to him as "one in whom the elements were so mixed as to constitute a man."

Dean Galbraith's Reminiscences

Dr. Galbraith, Dean of the Faculty of Applied Science, gave some interesting reminiscences. He had been identified with the City Engineers of Toronto since the day of Mr. Frank Shanly and he was impressed above all with the honorable record of all these officials. He could call to mind no city that had been graced with so many high-class men. Mr. Rust and his predecessors had laid a great foundation and had set an example which those who followed would find it difficult to emulate.

Others who spoke were Mr. A. F. Macallum, City Engineer of Hamilton; Mr. T. C. Irving, Jr., Chairman of the Toronto Branch of the Canadian Society of Civil Engineers; and Mr. Frederic Nicholls, General Manager of the Canadian General Electric Company.

The proceedings terminated with the singing of the National Anthem and "Auld Lang Syne."

During the evening the guest of honor was presented with a souvenir autograph album containing the signatures of all those who were present on the occasion.

A Canadian Firm as Empire-Builders

The World-Wide Operations of Messrs. Norton Griffiths & Company, Limited—The Personnel of the Canadian Concern

No contracting firms either in the Old World or in the New have made such phenomenal progress as Messrs. Griffiths & Company, Contractors, Limited, of London, with its allied companies in Canada, Australia, South Africa, Russia, South America, Mexico and India. The Canadian company is known as Norton Griffiths & Company, Limited, with offices in Montreal, St. John, Winnipeg and Vancouver; its offshoot, the Norton Griffiths Steel Construction Company, of Vancouver, has already done a large amount of work on the Pacific coast, while the largest contract of the Canadian company—that for the proposed harbor works at St. John, N. B.—has just been signed.

Mr. John Norton Griffiths, F.G.S., F.Z.S., M.P. for Wednesbury, Eng., is well known on this side. He is a great believer in the future of Canada and has voiced his Imperial sentiments on many visits to this country. He is a Conservative in politics, but places first and foremost Imperial consolidation. He is an ardent advocate of preferential trade and the consolidation of the Empire's armies and navies under one control, with representatives on the boards from the Over-Seas Dominions.

Mr. Griffiths was born in July, 1871, was married in 1901, and has two sons and two daughters. The British firm was started some eight years ago in partnership with Lord Howard de Walden, the first large

Mr. W. Burton Stewart, Vice-President and Managing Director

Mr. J. Norton Griffiths, M. P. President

Mr. P. R. Warren, Chief Engineer Eastern Branch contract undertaken being the Benguella-Katanga Railway, West Africa, 200 miles long, which was originally planned to join up with the great copperfields of Tanganyika. This railway was through most difficult country, and water had often to be carried as far as fifty miles. Ten thousand Indians were employed in the work.

The next contract of note was in London, Eng., where an enormous sewer was built, from Battersea to Deptford, for the London County Council. The sewer was ten feet in diameter and nine miles long. Six miles of this sewer was iron-lined and the remainder was of brick. This was followed by the Chile Longitudinal Railway, of 400 miles, costing about $20,000,000.

Another large project was the water supply at Baku, on the Caspian Sea, Russia, The waterworks comprised 120 miles of concrete pipe, each section being 6 ft. 6 in. in diameter, one metre long, and weighing four tons. The work also included the building of reservoirs and branch lines.

Mr. Norton Griffiths is president of the Canadian company. He is a member of the Institute of Mining and Metallurgy and of the Institute of Mining Engineers. He has seen plenty of active service in South Africa, as he served in the Matabele War in 1906-7, was in command of the scouts in Rhodesia in 1907, and in the British South Africa police, as captain and adjutant to Lord Roberts' bodyguard, headquarters' staff.

The Vice-President and Managing Director of the Canadian company is Mr. W. Burton Stewart, who looks after the business and financial departments particularly. He is the son of the late Mr. James Stewart, of Coatbridge, Lanarkshire, Scotland, and was born in 1872. His father founded the well-known firm of Stewarts & Lloyds, iron and steel pipe manufacturers, and his wife's father, Mr. P. Westmacott, was for many years managing director of Messrs. Armstrong, Whitworth & Company. Mr. Stewart was educated at Oxford and is a member of the Scottish Bar. He, like Mr. Norton Griffiths, has seen service in South Africa, where he was a member of the Imperial Yeomanry. Mr. Stewart has taken a great interest in British politics, having stood as a tariff reformer for the Stroud division of Gloucestershire. He also served for three years on the London County Council, being Vice-Chairman of the Improvements Committee and a member of the Tramways Management Committee. In 1905 he was political private secretary to the Marquis of Linlithgow, Secretary of State for Scotland. Sport has also taken up a good share of Mr. Stewart's time, for he played for Oxford in the Rugby match with Cambridge in 1892, twice rowed in the Inter-Varsity boat race, and won the Grand Challenge Cup at Henley, 1893-4, in the Leander Eight. He has been a wide traveller, having visited Egypt, India, China, Japan, Australia and the United States.

The Hon. Francis Carter Cotton, M.P.P., is another vice-president of the company. He lives in Vancouver and was formerly Finance Minister in the British Columbia Government. Mr. Cotton was at one time owner of the "News Advertiser" and is now connected with the British Columbia Trust Company.

Mr. P. R. Warren, who for ten years has been engaged in the construction of some of the largest dry docks and harbor works in the world, is the Chief Engineer of the eastern branch of the business. The Chief Engineer of the western branch is Mr. C. G. DuCane, for many years associated with Sir John Wolfe Barry, of London.

Blasting Ice in Slow-Sand Filters

During a recent period of severe cold weather water froze in the covered slow-sand filters at Wilmington, Del., and made it impossible to operate the Blaisdell sand-washing machine by which the filtering medium is cleaned. It was necessary to adopt radical methods to break up the ice in order to prevent a shut-down of the plant for any considerable length of time, and Mr. John K. Kienle, chief engineer of the water department, after a consultation with representatives of the Du Pont Powder Company, decided to blast away the ice with dynamite. The use of explosives to shatter ice jams in rivers is often resorted to, but this practice in connection with the operation of a water-purification plant is rather startling in its boldness. Mr. Kienle has supplied the Engineering Record with the following information:

At the filter plant the thickness of ice on the beds necessitated radical measures to break it in order to permit the washing of the beds with the machine. It was therefore decided to use dynamite, and this was done on January 18. The filter beds, when the machine was passed over them, were found to be air bound to such an extent that water could not pass through at the regular rate, and it was found necessary to back fill them with applied water in order to drive this air out. This was done for a period of 2½ hours, during which time water from Porter reservoir was distributed direct to the city. This action, Mr. Kienle states, was one of absolute necessity occasioned by the unprecedented action of the extreme cold weather upon the filters.

The thickness of ice was fully 6 inches, frozen solid the full width of the bed and extending at least two-thirds the length thereof.

The quantity of dynamite used for the first experimental shot was a 1½-lb. stick of 40 per cent. Red Cross, placed just beneath the surface of the ice. This shattered the ice at that point, and cracked it in large pieces in a distance approximately 20 feet in radius from the hole. Later when it was found that the concussion from the ½-lb. cartridge was not too great to damage the building, 2½-lb. sticks were used. These were cut in half, making four charges at four different points on the bed.

No damage to either the filter or the building is reported, though considerable vibration was felt in the roof. After the ice had been shattered and the machine was passed over the surface of the filters, it was found that the delay occasioned in washing the beds had resulted in negative loss of head which produced air binding and compacting of the sand to a depth beyond reach of the 12-inch teeth of the Blaisdell machine which were being used at that time. This necessitated the back filling of the beds as stated. The normal water consumption of Wilmington at this time of year is approximately 9,500,000 gal., while during the two weeks preceding the blasting of the ice the average consumption was in excess of 12,000,000 gal. daily. This, of course, acted as an additional handicap in the operation of the filters.

The use of dynamite in the filter was made after consultation with representatives of the Du Pont Power Company, upon whose suggestion the charge and per cent. of glycerine was used.

Constructional Progress at Vancouver

Unparalleled Activity in all its Branches—Heavy Expenditure by Railroads Supply Firms Busy—Current Prices of Materials

Special to The Contract Record

Office of the Contract Record,
Vancouver, B.C., May 8, 1912.

CONSTRUCTIONAL developments in the city of Vancouver and the surrounding municipalities during the coming summer will be conducted on a scale hitherto unequalled. The rapid nature of the city's growth in a building and commercial sense makes it imperative that the various branches of municipal construction work be pushed vigorously ahead in order to keep pace with increasing requirements. Railroad activity in the interior of the province, on Vancouver Island and at the Coast, will be very much in evidence and a number of important engineering projects in connection with the building of dams and reservoirs on the lower mainland and Vancouver Island will, it is understood, be rushed with all possible speed during the fine weather. Electrical and telephone companies are making arrangements to enlarge their plants and increase their operations; street railway extensions are already arranged; docks are in course of construction, and it is possible that the next few months will witness the commencements of extensive railway terminal improvements, and of dock and harbor schemes sufficient to cope with the increased shipping trade which the opening of the Panama Canal will make certain.

Road Construction in British Columbia

Mr. Foster, Deputy Minister of Public Works, stated recently while on a visit to Revelstoke, B.C., that work all over the Kootenay district would start immediately. For the Revelstoke riding $25,000 will be spent on the Columbia River south, while on the Columbia River road, west side, $5,000 worth of work will be done. On the Eagle Pass road $5,000 will be expended and on the Greely Creek road, $3,000, while the Big Ben district will receive $17,000 for roads and trails. The sum of $4,500 will be spent on roads and streets in the town of Arrowhead, while the Galena Bay road will receive $3,800 and Hall's Landing road, $5,000. The balance of the $110,000 will be spent on miscellaneous roads and trails throughout the district.

Arrangements have been made by the Deputy Minister for beginning the construction of the provincial section of the Banff-Windermere scenic highway, from the Sinclair Pass and canyon end, it having been determined to undertake this work by day labor under the special charge of a competent supervising engineer and foreman for each of the several sections, this course being adopted for saving of time. The Dominion Government is already proceeding with construction at its end, through the National Park, the big bridge at Castle Mountain being now under way with Messrs. Haffner & Wurtelle as engineers-in-charge. As soon as this bridge and the road connecting with it, are available for use, the British Columbia Government will inaugurate work at this end of the new road. It is expected that rapid progress will be made with work in this section generally, excellent weather prevailing and the seasonable conditions being especially favorable.

The Banff-Windermere road is already being talked of continentally, as it is certain to become one of the noted tourist and scenic highways of the continent. It will have, when completed, a total length of about 110 miles, with a maximum altitude of about four thousand feet, and an average grade of only about three and a half per cent.

The recently finished dam of the Bear Creek reservoir on Vancouver Island, built by the Vancouver Island Power Company, is by far the largest of any similar engineering works in British Columbia though it will be eclipsed by that at Coquitlam when completed. Its length is 2,000 feet and depth 60 feet, and it converts Bear Creek into a reservoir of 175 acres with a depth of 50 feet of water against the dam. The work, begun twenty-two months ago, has been executed by hydraulic pressure, the mountain side above being sluiced down to fill in the sides and dam.

There is a spillway of concrete to give exit to the water. This has been constructed to take down five times the maximum amount of water that has ever been recorded in the observations of ten years.

From the reservoir the water flows down the bed of the river for four miles and then enters a flume which took 5,000,000 feet of lumber to construct, and by which it is conducted for six miles to the Forebay reservoir, from which a pressure pipe takes it for 9,000 feet down to the power house at sea level. The fall from Forebay reservoir to the power house is 1,150 feet, which gives 550 lbs. pressure to the square inch on the water baskets and at the nozzles. The completion of this dam means that the company now has sixty million kilowatts of stored energy.

Besides the Bear Creek reservoir, another reservoir—the Jordan River—is to begin at once and this will provide 125 acres of water. Here a concrete dam will be put in and the whole work will cost $280,000. This lies directly to the westward, about a mile and a half distant. To the south, a third reservoir is to be begun shortly on Alligator Creek with an acreage of 123 acres. When all three are completed the company will be in a position to supply 36,000 horse power, of which 12,000 will be available two months from now.

Important Railway Developments

The construction of the Esquimalt and Nanaimo Railways extension from McBride Junction, a point on the Alberni branch near Nanaimo, north to Courteney, along the east coast of Vancouver Island, will be in full swing this summer. The work involves a very large expenditure. The objective to be reached at a later period is said to be a port in the northern end of the island.

Announcement was made recently of the award of a contract to M. E. Hoard, of Victoria, for a ten-mile section of the line from Courteney, south to Union Bay in the Comox district. Mr. Hoard is now locating his camps and grading will commence shortly. Tenders have also been called for building another ten-mile section from McBride Junction leaving an intervening gap of twenty-five miles on which the clearing of the right-of-way is now in progress.

In order to provide transportation facilities for the owners of timber limits and mineral claims in the Green Lake district near Vancouver, the Howe Sound & Northern Railway Company is calling for tenders for the construction of thirteen additional miles of its main line in the Squamish Valley northward as well as for a branch line from a point near Newport, to a point on the east side of Howe Sound, a distance of two miles.

The contract for thirty-five miles of road in the Kettle Valley line west of Penticton in the Okanagan district, B.C., has been awarded to Messrs. G. A. Carlson & Company, railway contractors, of Spokane, Wash. Their contract will begin above Trout Creek and run to Osprey Lake, half-way to Princeton. No time limit has been set for the completion of the contract but in all probability it will be completed early in 1913. Employment will be given to 1,500 men, and when the Carlson firm get the full force at work in their new contract, it will mean a payroll of almost $100,000 per month. The material for the three steel bridges in the first five-mile section west of Penticton is already on the way, while work has been started on the spur line through Penticton.

Railhead on the Canadian Northern Railway in British Columbia is now at a point twelve miles west of Hope, which town will be reached as soon as bridges across Silver and Hunter Creeks have been built. Messrs. T. H. White, chief engineer of the company, and F. G. Gamble, of Victoria, provincial government engineer, went over the line recently and found it in good condition.

Mr. Patrick Welch, vice-president of the Pacific Great Eastern Railway, and a member of the well-known contracting firm of Messrs. Foley, Welch & Stewart, does not anticipate any particular difficulty in obtaining a sufficient supply of labor for the construction of the line from Vancouver to Fort George. Although the construction of the Pacific Eastern Railway will hardly commence before the beginning of next year, Mr. Welch is at present engaged in a thorough investigation of the labor situation in order to avert a repetition of the trouble which recently suspended work on the C. N. R. construction. The construction of the new line will employ a large number of men and Mr. Welch is desirous that when the work is commenced its progress shall not be impeded or interfered with unnecessarily. Mr. Welch does not anticipate much difficulty in laying out the route or, when that is done, having it constructed on time.

The Grand Trunk Pacific is taking practical steps for the construction of terminals at Prince Rupert suitable for the ocean port of a great transcontinental system. Mr. Boag, of New York, who has a wide reputation as a harbor engineer, is at present engaged in making an inspection of the waterfront with the object of preparing a comprehensive report upon the best method of laying out the waterfront for the company. The Grand Trunk Pacific is preparing for vast expenditures in connection with excavation along the waterfront in order to supply the commodious yards and sidings. In addition to the ordinary shipping facilities, including grain elevators, the northern terminus expects to have a dry dock and all the other equipment for a seaport of the first-class.

Big Contracts Awarded

Messrs. M. P. Cotton & Company and the Canadian Mineral Rubber Company secured the lion's share of the asphaltic mixture pavement contracts awarded by the Board of Works in Vancouver recently. Out of a total of 265,289 yards, covering sections of twenty-six streets, M. P. Cotton & Company obtained 100,000 yards, and the Canadian Mineral Rubber Company a like amount. Messrs. T. R. Nickson & Company received 17,500 yards and the Columbia Bitulithic Company 15,000 yards. A balance of 32,789 yards was left over for future consideration. The amount represented in the laying of this pavement will total almost $1,000,000.

Construction work in connection with the British Columbia Portland Cement Company's new plant at Princeton, B.C., was commenced recently and general building operations are well under way. The factory will have a capacity of 700 barrels a day with one unit in operation. Provision will be made for two additional units so that the plant when completed to its full capacity will manufacture 2,000 barrels per day. The British Columbia Portland Cement Company is a Vancouver concern and the new plant now in course of construction is the first to be established on the mainland of this province.

The Point Grey Council recently awarded the largest contract for sewer construction ever given in suburban Vancouver to Mr. Geo. H. Webster. The contract calls for the laying of large drains throughout the Kerrisdale and Magee districts. The work of construction will cost the municipality $153,000.

Building Activity

Building permits issued in the city of Vancouver during the month of April totalled $1,481,905—a slight increase on the figures for March and an advance of approximately $300,000 on permits issued during April, 1911. Permits for several large blocks under contemplation have yet to be issued. An extremely active summer is anticipated in all branches of the building trade.

The Supply Market

The leading building supply firms of Vancouver report a decided increase in the demand for all lines during the month of April. Trade has advanced rapidly since the beginning of the year, both in the city and up-country. Brisk returns are reported from the Fort George and Okanagan districts, where constructional developments have been strongly in evidence this spring. There is an ever-increasing demand for building materials from the interior. Vancouver firms have been successful in annexing a considerable portion of the trade in these outlying parts. Judging from the satisfactory conditions of the local market at present there seems every likelihood of a long and prosperous season for the building supply firms.

Current Prices of Building Material at Vancouver

Building paper, No. 1, tarred, per roll	$ .62½
Building paper, plain, per roll	.70
Brick, common, per thousand	13.00
Bricks, pressed, per thousand	45.00
Cement, Portland, per bbl.	3.25
Roofing, felt, per 100 lbs.	2.35
Fire brick, per thousand	45.00
Lime, per barrel	1.35
Sewer pipe, per foot, 4-inch	.15
Plaster of Paris, per bbl.	4.25
Putty, per pound, bladders in 100 lb. cases	3.40
Hard wall plaster, per ton	15.00
Nails, wire, per keg	3.25
Nails, cut, per keg	4.25
Mixed paint, per gallon	2.50
Boiled linseed oil, gallon in barrels	1.25
Boiled linseed oil, per gallon	1.35
Hair fibre, per ton	15.00
Fire clay, per ton	15.00
Lath, No. 1 pine	2.75
B. C. Cedar Shingles, No. 1	2.10
B. C. Cedar Shingles, No. 2	2.00
Lead pipe, per lb.	.06½
Dry colors:—	
White lead, per lb.	.07
Red lead, per lb. kegs	6.50
White lead, per 100 lbs. in oil	8.50
Gasoline in barrels, per gal.	.30

The engineers constructing the wharf and piers of the Great Northern Railway between Hastings Mill and the Sugar Refinery, Vancouver, have encountered a ledge of rock extending throughout the whole area of the outer foundation for the piers. The ledge is within four feet of earth surface, so that the cost of building has been almost doubled. An order for some sixteen hundred creosoted piles for the wharf has been contermanded and an order for six hundred substituted. Instead of creosoted piles, concrete must be used for all outside work and concrete slabs set down between the piles. Were this method not used the dock could not stand the weight put upon it combined with the wash of the waves, for three months. Instead of a firm earth foundation for creosoted piles of eight feet or more, an average depth of between four and five feet of slippery earth has been found in which a pile could hardly stand of itself. In one spot Messrs. W. H. Chase & Company, who are building the wharf leading to the prospective Balfour-Guthrie pier, found a depth of only eight inches and were forced to build a temporary trestle to keep the piles in place.

The importance of securing ground for park purposes in the central part of the city; the advisability of improving and beautifying adjoining public buildings; the splendid effect which would be produced by a seawall and promenade at Kitsilano Beach, and the necessity of purchasing more wooded waterfront stretches and picnic grounds for the children are emphasized in the report of Mr. Thos. H. Mawson, the park specialist, just received by the Vancouver Park Board.

Mr. D. R. Harris, C. E., who for some time has been prosecuting the work of taking soundings for the breakwater at Victoria to be constructed by the Federal Government in connection with the scheme of improvements at the outer harbor, reports that excellent progress has been made. Upwards of five miles of soundings have been taken, the work often presenting serious difficulties as it was not possible to continue unless wind and tide conditions were favorable.

Personal Mention

Mr. A. B. Lee has been appointed Secretary-Treasurer of the Woodstock Water and Light Commission.

Mr. L. A. Thornton, City Engineer of Regina, Sask., has been elected a city commissioner for that municipality. Mr. Thornton is a native of Kingston, Ont., and is thirty-two years of age. He has had extended experience in engineering work and was appointed city engineer early in 1910.

Mr. R. H. Parsons has been appointed superintendent of the municipal power plant at Edmonton, Alta.

Mr. J. Russell Ellis has resigned as city engineer of Columbia, Mo., to become assistant engineer with the city of Regina, Sask.

Mr. H. H. Brazier, of the Toronto Works Department, has been appointed assistant to Mr. G. W. Wright, City Engineer of London, Ont.

Mr. G. C. MacLellan will supervise power development work at Minnedosa, Man., for Messrs. C. H. & P. H. Mitchell, consulting engineers, Toronto.

Mr. C. I. Printz, consulting engineer, 121 Delaware Ave., Toronto, has been appointed Ontario representative for Messrs. Escher Wyss & Company.

The Provincial Government of New Brunswick have appointed Mr. D. S. Maxwell to the position of engineer on the construction of the St. John Valley Railway.

The Canada Wire & Cable Company, Limited, have appointed Mr. E. F. Bradley their sales manager. Mr. Bradley has been identified for some time with the Canadian General Electric Company.

Mr. Mellis Ferguson, Stratford, Ont., has been appointed City Engineer of Guelph, Ont., to succeed Mr. James Hutcheon. Mr. Ferguson is a graduate of Queens University, Kingston, and went to Stratford four years ago.

Mr. G. W. Wright, City Engineer of London, Ont., was a recent visitor at the Toronto City Hall. Mr. Wright was accompanied by Mayor Graham. The object of the visit was to confer with City Engineer Rust in regard to car routes in London.

Mr. John L. Weller, superintending engineer of the Welland Canal, at St. Catharines, Ont., has been appointed engineer in charge of surveys, design and construction of the new Welland Ship Canal connecting Lakes Erie and Ontario. This canal will have a depth of 30 ft. of water on the miter sills and a bottom width of 200 ft. ,and will over-

CHANGES IN THE MUNICIPAL CIRCLE

Mr. R. Potter, City Engineer of Fernie, B. C., who has declined the position of City Engineer of Regina to go into private practice.

Mr. M. Ferguson, City Engineer of Stratford, who succeeds Mr. James Hutcheon as City Engineer of Guelph.

Mr. L. A. Thornton, City Engineer of Regina, who becomes a City Commissioner for that municipality.

come a difference in levels of 326 ft. in 25 miles. Mr. W. H. Sullivan, who has been assistant to Mr. Weller for several years, has been appointed superintending engineer of the present Welland Canal system to succeed him.

It is feared that Mr. Lawrence Kenny, of the firm of Kenny Bros., contractors, Kingston, Ont., lost his life in the "Titanic" disaster. He had been in England since April 1 and was to return to Canada about the time that the Titanic sailed. No news has been received from him.

Mr. R. L. Werry, who, as recorded in our last issue, has been appointed secretary-treasurer of the Montreal Builders' Exchange in succession to Mr. J. H. Lauer, is a native of Bowmanville, Ont. For the last fourteen years he has resided in Montreal, where he has been actively engaged in journalistic work. Mr. Werry's work has brought him in touch with a wide circle of business men and he will no doubt be eminently successful in his new sphere.

Mr. R. L. Werry, the new Secretary-Treasurer of the Montreal Builders' Exchange

Mr. C. H. Rust, the retiring city engineer of Toronto, was tendered a farewell dinner by members of the National Club on May 8th. Those present included representatives of the leading interests in the city. The municipality was represented by His Worship Mayor Geary and the City Clerk, Mr. Littlejohn.

Mr. F. W. Cowie, chief engineer of the Montreal Harbor Board, and Col. W. F. Anderson, chief engineer of the Marine Department, will be delegates to the International Congress on navigation which meets at Philadelphia this summer, after which the leading engineers of the world will journey over the Canadian waterways from Sault Ste. Marie to Quebec.

Mr. Charles R. Boucher, an engineer in the construction department of the Algoma Central & Hudson Bay Railway, died recently at Sault Ste. Marie, Ont. At the time of his death he was engaged in building bridges in connection with the new improvements of that road. He had also been extensively engaged in railroad work in the United States.

The Canadian Northern Railway has appointed Mr. W. C. Lancaster, E.E., M.E., of New York, superintendent of plant design and of electrification on the engineering staff that will have charge of the tunnel through Mount Royal, Montreal. He will superintend the design and construction of the plant and later the electrification of the lines. Mr. Lancaster has had a wide experience in tunnel building and the electrification of various American lines.

A Distinguished Road Engineer

Arthur H. Blanchard, who occupies the position of Professor of Highway Engineering at Columbia University, received the degree of C.E. from Brown University and A.M. from Columbia University. For twelve years he was a member of the Faculty of Civil Engineering at Brown University. Professor Blanchard has also been connected with the City Engineer's Office of Providence, the Berlin Iron Bridge Company, the American Bridge Company, and for seven years was associated with the State Board of Public Roads of Rhode Island as Deputy Engineer. During 1910-1911 he investigated the roads and pavements of Europe. At present, in addition to having charge of the Graduate Course in Highway Engineering at Columbia University, he is a consulting highway engineer to various states and municipalities and Consulting Engineer to the U. S. Office of Public Roads. Professor Blanchard has contributed to various technical periodicals in this country and abroad and to the proceedings of various engineering societies in the United States, England and France. He is author with Henry B. Drowne of "Highway Engineering as Presented at the Second International Road Congress."

In 1910 Professor Blanchard was one of the United States Reporters to the Second International Road Congress in Brussels and has recently been appointed United States Expert on Road Materials in the International Association for Testing Materials. He is a member of the Committee on "Bituminous Materials for Road Construction;" of the American Society of Civil Engineers; of the Committee on "Road Materials" of the American Society for Testing Materials, and of the Committee on "Paving Nomenclature" of the American Society for Municipal Improvements. Professor Blanchard is a member of the American Society of Civil Engineers, Membre Societaire Titulaire of the Societe des Ingenieurs Civils de France, Fellow of the American Association for the Advancement of Science, and Member of the Honorary Scientific Society of Sigma Xi, American Society for Testing Materials, American Society for Municipal Improvements, American Road Builders' Association, American Chemical Society, American Association for Highway Improvement and other societies in this country and abroad.

Mr. A. H. Blanchard, Professor of Highway Engineering in Columbia University

Construction News and Business Notes

Building permits issued at Moose Jaw last month totalled $[illegible]—four times the total for April, 1911.

Building permits to the value of $518,448 were issued at New Westminster, B.C., this year up to April 30.

Canadian fire losses for the month of April, 1912, are estimated at $1,355,055. The figures for April, 1911, were $1,317,900.

The city of Westmount, P.Q., will spend $83,505 on paving streets and lanes and laying sidewalks and channels; 63,684 square yards will be paved.

The permits issued at Victoria, B.C., during the first four months of 1912 are valued at $3,352,725, compared with $894,450 for the corresponding period of last year.

The National Sand & Material Company, Limited, Welland, Ont., were incorporated recently with a capital of $40,000. They will manufacture and deal in builders' supplies.

Recent incorporations at Montreal include the General Improvement & Contracting Company, Limited, capitalized at $100,000, to carry on business as contractors and supply dealers.

A new general contracting concern at Toronto is the Lewis Construction Company, capitalized at $40,000. The directors include Messrs. E. C. Lewis, H. W. Middlemist and H. A. Hawley.

A charter has been granted to the Builders' Exchange of the city of Hamilton. The provincial directors named are Messrs. A. Heatley, A. Somerville, G. Montrose, J. Poag, R. Press and J. McNeill.

The engineering department of the Montreal Council propose to experiment in the use of oil on the roads as a means of keeping down the dust. It will be employed only upon macadamized roads.

The Stevenson Construction Company have purchased the business of the firm of Stevenson & Bray, Limited, Montreal, including all the assets and liabilities, and will carry on a general contracting business. The new office will be at 16 McGill College avenue, Montreal.

The Regina, Sask.. building permits for April totalled $663,145, compared with $562,490 for April, 1911. The value of the building work for the first four months of the year shows a small decrease on that of the corresponding period of 1911, the totals being, respectively, $1,092,625 and $1,184,715.

Complaints having been made as to the water supplied by the Saraguay Water & Power Company to the people of Bordeaux and other wards, two representatives of the company have asked the Montreal Board of Control to allow fifteen months in which the company may install a filtration plant.

Mr. E. L. Cousins, engineer to the Toronto Harbor Commission, has submitted to that body the report prepared after his recent extended tour of investigation of the harbors along the Atlantic and Gulf Coast ports of the United States. We hope to publish this report in our next issue.

The Manitoba Good Roads Association have inaugurated a split log competition. In addition to various trophies offered by industrial concerns, cash prizes amounting to $200 will be awarded. The competition is open to all municipalities that are members of the Association. Entrance must be made not later than June, 1912.

Work has commenced on the Union Stock Yards at Winnipeg which are being built by the Grand Trunk Pacific Railway, jointly with the C. P. R. and C. N. R. An arrangement has been made to spend $500,000 this season and to have the yards completed by the coming autumn. The Union Stock Yards Company has just paid over to the city of St. Boniface the sum of $20,000, as its contribution to the cost of the large main sewer that will connect with the yards. The public abattoir will also be put under construction immediately, $50,000 having been voted for that purpose at the recent session of the Manitoba Legislature.

A million-bushel elevator is to be constructed by the Quebec Harbor Board. It will be of steel and concrete and so built as to be capable of extension for storing two million bushels of grain. The new piers are to be built in addition to the Louise embankment. These will be in line with the breakwater extension from the main pier out towards the centre of the St. Charles River.

The Tregillus Clay Products Company has been organized at Calgary, Alta. The capital investment in lands, buildings and machinery is $500,000. The construction of the plant is now in progress. When completed the plant will employ 200 and ultimately 500 workmen. The plant will be located in the Bow Valley, some four miles west of the city of Calgary.

A noteworthy building contract at Montreal is that for the Royal Trust Company's building, the general contract for which was awarded recently to the Canadian Norcross Bros. Company. The building will be of steel construction with Stanstead granite exterior. The granite will be cut at Messrs. Norcross Bros.' plant at Iberville, Que. The contract for the demolition of the old building is being carried out by Messrs. W. Lajeunnesse & Company, of Montreal.

The Builders' Exchange, Montreal, through their board of directors, are supporting a "City Cleaning Day" movement, and have addressed the mayor and civic controllers in favor of a scheme put forward some time ago by the Civic Improvement League. The Directors have asked that a day be set apart for the general cleaning up of lanes, yards and streets throughout the city, and that all householders be requested to co-operate with the city authorities in removing refuse and improving the appearance of all outside premises.

Tenders are to be called for the improvement of the historic Champ de Mars, Montreal, the plans having been submitted to Mr. F. C. Todd, landscape architect. The improvements include a main entrance between the City Hall and the Court House, with steps and balustrade. There are to be retaining walls in Gosford street and St. Gabriel street, which are also to be surmounted by a balustrade. There will be a balustrade along Craig street on the slope, with wide stone steps in the centre and at both ends. Some thirty clusters of electric lights will encircle the field.

According to a report from Quebec City, the Harbor Commissioners have decided to inaugurate extensive improvements. They will call for tenders for the construction of a grain elevator of from one to two million bushels capacity, to be erected between piers 1 and 2 of the breakwater extension connecting with the Louis embankment. The Commissioners have decided to cut away the east ends of the customs and East Indian wharves and bring them in line with the pontoons. Tenders for the construction of a capacious car ferry, to be used to transport cars across the river during both winter and summer, are to be asked for. About $1,000,000 will be spent this summer.

It is officially announced by the Hon. Mr. Cochrane, Hon. Mr. Pelletier and Major Leonard, that, as a result of a visit to Quebec, the most suitable way for the Transcontinental Railway to enter the city is by placing a tunnel from Wolfe's Cove to St. Halo, with a union passenger station at the Palais. The Champlain Market site will be utilized for local freight. An elevator of some ten million bushels capacity is necessary. It should be built in such a way that other units may be added, so as to handle from twenty to thirty million bushels. The Government has bought, in St. Malo, two hundred acres of property, which will be used for a car yard. As to the work shops, the site already chosen at St. Foye, near the bridge, has been finally decided upon. There will also be car ferries, which will take care of the traffic pending the completion of the Quebec bridge. The work will be begun as soon as the plans are completed and will be brought to a satisfactory completion without delay.

Messrs. Murray & Spencer, Niagara Falls, Ont., have the contract for the installation of a sewage disposal system at Oakville, Ont., and Mr. Peter Lorenzo has the contract for 13 miles of sewers there. The Lethbridge system will be installed at Oakville. Messrs. Murray & Spencer also have the contract for extensive enlargements to the Sanitary Canada Company's factories at Niagara Falls.

On May 2nd, a deputation of over one hundred delegates from municipalities on the south shore of the St. Lawrence requested a guarantee of 4½ per cent. on $15,000,000 for fifty years, on the undertaking of the Montreal Tunnel Company. The proposal is to tunnel under the St. Lawrence, starting from St. Lambert on the south side, and under the streets of Montreal to Cote St. Michel, with a terminus in the city. It is also proposed to provide accommodation for steam and high speed electric railways, preference being given to the Intercolonial. Messrs. Jacobs & Davis are the engineers.

Messrs. Saxe & Archibald, Montreal, have designed a ten-storey building and basement for the Sauvegarde Insurance Company, to be erected at the corner of Notre Dame and St. Vincent streets, Montreal. The cost is estimated at $200,000. The area is 40 x 106 and the structure will consist of a steel frame, with sandstone front on the two streets. The foundations will be of concrete, and a large amount of the same material will also be used in the construction. The interior is to be finished in oak, while the windows will have cast-iron frames. There is to be a vault on each floor. Two high-speed elevators are to be installed. There will be electric lighting.

An interesting booklet setting forth the merits of Carbonizing Coating has been sent us by the Goheen Manufacturing Company, Canton, Ohio. It is claimed for carbonizing coating that it is the greatest and most economical paint made for the protection and preservation of iron and steel. This booklet contains excellent half-tone views showing some of the noteworthy construction into which this product has entered. Some of the largest railway bridges and viaducts in the United States have been treated with Carbonizing Coating while its application in numerous important industrial buildings atests its value in that field. The company guarantee that one imperial gallon, properly applied, will cover 1,250 square feet of clean metal surface.

The Alberta Government is making a great effort for the completion of the highway from Edson, Alta., on the Grand Trunk Pacific to Grande Prairie and Peace River, which has been under construction for the past two years. A large gang was set to work in the middle of April, north of Edson, in completing the last forty miles of road for use at all seasons, so as to enable heavily loaded transport waggons to make the trip expeditiously and with economy. It is expected that in about two months waggon loads of two tons will make the trip between these places in six days, the best previous journey from Edmonton via Lesser Slave Lake having been about six weeks. All the winter [illegible] up to 15 transport sleighs have been leaving Edson daily for the Peace River Country, the road being good for winter travel, and these have frequently run to 2½ tons.

Since the beginning of the year the Ambursen Hydraulic Construction Company of Canada, Montreal, have secured contracts totalling a million dollars. The latest order is for a dam and canal for the city of Prince Albert, Sask., which is to be used in connection with a hydro-electric power scheme. The plant will develop 15,000 horse power, and will be situated on the Lacolle Falls, on the North Saskatchewan River, 25 miles from Prince Albert. The dam is to be reinforced concrete and will be 755 feet long, while the lock will be 250 x 40. The contract price is $600,000. Work is to be commenced at once and the company will put between 600 and 700 men at work. It is hoped that the contract will be completed in about eighteen months. Part of the plant used in connection with the irrigation dam being constructed for the Canadian Pacific Railway at Bassano will be transferred to Prince Albert. Messrs. C. H. & P. H. Mitchell, of Toronto, are the consulting engineers for the Prince Albert scheme.

Building permits at Winnipeg passed the five-million-dollar mark for the third of the year on April 30, establishing an absolutely new record for the first four months of any building year in the history of Winnipeg. The actual figures are $5,030,710 as compared with a total of $3,790,550 for the same period last year. The increase in the number of permits and in the number of buildings represented compares favorably with the increase in totals. For the four months ending April 30, 1,089 permits had been issued for 1,373 separate buildings; for the first four months of 1911, 900 permits were issued for 1,095 buildings. The increase for the four months of 1912 over the corresponding period of 1911 is $1,240,160. Figures for the month of April, 1912, show an increase over the same month last year. April, 1911, set a new record and it was hardly expected that it could be surpassed this year. In April, 1912, 495 permits were issued for 617 buildings, estimated to cost $2,106,900; during April, 1911, 500 permits were issued for 602 buildings, costing $2,039,150.

The building permits issued at Edmonton, Alta., during the month of April amounted to $2,102,770, compared with $389,477 for April, 1911—an increase of no less than 440 per cent. The totals for the four months show an almost proportionate gain, the 1912 and 1911 figures being respectively $3,384,732 and $850,377, an increase of 398 per cent. The month of May opened with almost as much work in progress as was done in the entire season of last year and considerably more than in any previous year. The buildings now in progress include three wholesale warehouses. Contracts for many important undertakings are pending. The installation of the extensive equipment of the Sandstone Brick Company is proceeding rapidly. There is unprecedented railway activity in the Edmonton territory. Construction is proceeding on the main lines of the G.T.P. and C.N.R. to the West; on the C.N.R. Peace River Branch to the North-west; on the C. N. R. Athabasca Landing branch to the North; on the C. N. R. branch to Pakan to the North-east; on the C. N. R. line to Camrose and also on the G. T. P. line to Calgary.

North Transcona, Man., is to have another big manufacturing plant before the close of the year. The Manitoba Bridge and Iron Works Limited, have secured an option on thirty acres as a site for a million-dollar steel plant. The property in question lies east of the new Canadian Pacific Railway yards at North Transcona and is at the junction of the lines of the Canadian Northern and Grand Trunk Pacific railways. Mr. T. R. Deacon, president and general manager of the Manitoba Bridge and Iron Works, Limited, has just returned from Gary, Indiana, where he has been inspecting the plant of the American Bridge Company. He was accompanied on this trip by Mr. H. A. McKay, chief engineer of the Winnipeg concern. The plant of the American Bridge Company is one of the most modern of its kind on the American continent, and the new plant at Transcona will be modelled upon that now in operation at Gary. Engineers of the Manitoba Bridge and Iron Works are now at work upon the plans and it is expected that construction will commence in four weeks' time. The first building to be erected will be a bridge building plant, 160 feet by 90 feet, and the other buildings will be added as rapidly as possible. The president of the company states that the new plant will be in operation by January 1, 1913.

In the Winnipeg district a large amount of railway work is projected this spring and summer, including the Hudson's Bay railway. Work has already been started at some points and will add to the year's activity considerably. Construction work on the new parliament buildings will be started this year at Winnipeg. The palatial Grand Trunk hotel "Lord Selkirk" is now well under way, and work on the new Agricultural college is now resumed. The new Dominion Government Armory is also on this year's programme. Among the splendid new buildings to be completed or started during the coming year are the Bank of Montreal, Canadian Bank of Commerce, Union Trust Company's building, Confederation Life building, Sterling Bank extension, the Boyd, Free Press and Lindsay buildings.

Representatives of the Montreal Builders' Exchange and joint committee of the bricklayers and stonemasons on April 30th held a conference at the Builders' Exchange at which the terms of a new two years' agreement were discussed. The men asked for an increase of five cents an hour, which will bring the wages of the bricklayers to 55 cents an hour, masons to 50 cents an hour and bricklayers at conduit and sewer work to 65 cents an hour. The men also want Saturday afternoons off during June, July and August. The committees provisionally agreed to these terms, subject to ratification by the Unions and the Builders' Exchange. The present agreement expires on July 1st. If the new terms come into operation the Saturday half holiday this year will only affect the months of July and August, but the three months in the subsequent years. The Builders' Exchnge was represented by Messrs. J. H. Lauer and R. Hutchinson; the Bricklayers' Union by Messrs. Jos. Verdon and Geo. Francour; and the Masons' Union by Messrs. Sheriff and Laporte, Mr. Jas. Cerdon acting as joint secretary.

The executive offices and New York show rooms of the H. W. Johns-Manville Company, manufacturers of asbestos, magnesia and electrical supplies, have been removed to the new twelve-storey "H. W. Johns-Manville Building," Madison avenue and 41st street, New York City, from their old quarters at 100 William street, where they have been located for the past fifteen years. This move marks the 54th anniversary of the company. They now have factories located in Brooklyn, N.Y.; Milwaukee, Wis.; West Milwaukee, Wis.; Hartford, Conn.; Nashua, N.H.; Lockport, N.Y., and Newark, N.J., with an asphalt refinery at South Amboy, N.J.; and extensive asbestos mines at Danville in the Province of Quebec, which are the largest in existence and produce an exceptionally fine grade of asbestos. They also have a branch house in every city of any size in the United States and Canada, as well as representatives in foreign countries. In the new quarters, the company will have the distinction of being one of the few manufacturing concerns which occupy an entire twelve-storey office building. The company now occupies over 2,657,160 square feet of floor space or about 61 acres. The employees number approximately 5,000 and there are about 425 salesmen.

Messrs. McGregor & McIntyre, Limited, have secured a site of rather more than ten acres on the east side of Shaw street, immediately north of the Toronto Power Company's right-of-way, upon which they will erect structural steel works, consisting of a main building 85 by 400 feet in dimensions. On the north side the accommodation will include a smith shop, machine shop, store room, tool room, small boiler house for heating purposes, pattern and template shop 46 by 140 feet. On the south side there is a lean-to of 10 feet extending the full 400 feet along the length of the main shop. This lean-to is for the accommodation of the heating furnace, rivetting and bolt storage, lockers for workmen, etc. The works will be equipped with the most modern machinery, operated by individual motors, The handling facilities will consist of electric cranes and air lifts of the most modern type. Electric cranes will be used in the stock yard and receiving yard, and also for the finished material storage. These cranes will be of the two-winch type, 15 tons capacity, and will be manufactured in Toronto by Mr. John T. Hepburn. For the beam stock yard a locomotive crane of 15 tons capacity will be installed. The latter crane will do all the switching of cars on the company's own siding. The company will have excellent railway accommodation from the C. P. R. and later, it is expected, from the C. N. R. The office building is designed to meet the particular requirements of the firm and will contain draughting room, vaults, and accommodation for the various departments.

New Clay Works Organization at Halifax

The Nova Scotia Clay Works, Limited, with head office at Halifax, Nova Scotia, has recently been organized for the purpose of taking over, enlarging, and extending, a half-dozen or more brick yards in that province. The majority of the company's plants are situated on tide water, and can ship both by water and rail.

The production of the company's plant at Pugwash, Nova Scotia, is being greatly enlarged, and a new plant with every modern facility is being erected at Annapolis, N. S.

All the yards are conveniently situated for economy of manufacture and the minimizing of freight rates in reaching the large consuming markets.

The company is in good hands. The management is active, experienced and competent. Mr. R. L. McDonald, formerly President of the Maritime Clay Works, Limited, is the Vice-President and Managing Director of the new Company. Mr. F. S. Coombs, with offices at 98 Granville street, Halifax, N.S., has been appointed secretary and sales manager.

Saskatchewan Association of Builders' Exchanges

At a meeting of the above Association held last week at Moose Jaw, Sask., a new schedule of wages was drawn up for the building trades. Bricklayers and stonemasons will receive a minimum of 67½ cents an hour, in place of the present rate of 65 cents. Carpenters will have 45 cents instead of the graded scale of 40-45 cents an hour. Plumbers and steamfitters will be paid 60 cents an hour instead of 50-55 cents. Plasterers will receive 60 cents and stonecutters 65 cents, as formerly. This schedule will remain in force until February 1, 1913. This was the organization meeting of the Provincial Association and representatives were present from Regina, Saskatoon, Moose Jaw and Prince Albert. The election of officers resulted as follows: President, Mr. W. A. Wilson, Regina; vice-president, Mr. A. Holmes, Prince Albert. Directors, Mr. H. Navin. Moose Jaw; Mr. D. Smith, Saskatoon; Mr. W. Knox, Prince Albert; Mr. R. J. Lecky, Regina. The secretary is Mr. G. Powell, Regina. The first annual convention of the Association will be held in Prince Albert, probably in the first week of February next.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Port Stanley, Ont.

Roadway and waterworks, cost $8,000. Owner, City of London. Mayor Graham. Council contemplate building a roadway to Hotel Invererie, and installing new hydrants and water mains in the picnic grounds. Tender called shortly.

Sherbrooke, Que.

Paving tenders received by clerk until May 17th, Wellington street 8900 yds., King street 6200 yds., Bridge street 2,100 yds., Depot street 1100 yds. Natural, Lake, Sheet Asphalt, or Bitulithic. Cheque for 10 per cent. to accompany tender. Sec.-treas., T. J. Griffith. Specifications from City Engineer, Thomas Tremblay.

Simcoe, Ont.

Sewerage system to cost $35,000. Town council to submit by-law. W. C. McCall, Clerk.

South Vancouver, B.C.

Sewers to cost $500,000. By-law to authorize issue of debentures given second reading. Ratepayers will vote May 18 or 28 for the immediate construction.

Tilbury, Ont.

Sewers to cost $4,500. Plans being prepared. Tenders called shortly.

Wellesley Township, Ont.

Drainage work. Reeve A. B. Robertson, Wellesley P.O., will receive tenders until May 30th. Town Clerk, T. F. [illegible].

CONTRACTS AWARDED

North Battleford, Sask.

Paving to cost $48,500. Engineers, Chipman & Power, Mail Bldg., Toronto. Contractors, Kilbright & Sutherland, Calgary, Alta.

Port Arthur, Ont.

Paving, curbs and gutter laying. Gen. contractors, Warren Bituminous Paving Co., 103 Bay street, Toronto, and National Paving Co., Winnipeg Man. Engineer, L. M. Jones. City clerk, J [illegible]

Sudbury, Ont.

Main sewer, Contractors, C. F. Gibson & Son.

Sherbrooke, Que.

Extensions to sewers to cost $15,000. Belleview Park, for Sherbrooke Real Estate Co. President, T. M. Craig. Engineer, Thomas Trunklay. Work by day labor.

Railroads, Bridges and Wharves

Counties of Grey and Wellington, Ont.

Bridges. Tenders received by R. J. Shiel, Mount Forest, Ont., for A—Retaining walls for Mt. Forest. B—Concrete abutments for Smith. C—Moore 35-ft. concrete girder. D—O'Dwyers, 75-ft. steel bridge and concrete abutments. Plans from Bowman & Connor, 36 Toronto street, Toronto.

Hamilton, Ont.

The Dominion Government contemplate cutting through beach, heavy concrete abutments on lake and bay sides. New bridges required. Survey Engineer, Mr. Phelp. Gov. Engineer, J. G. Sing, Confederation Life Bldg., Toronto.

Meaford, Ont.

Steel bridge to be erected over Big Head River. at Syke St. Chairman, J. M. Scott.

Owen Sound, Ont.

Retaining wall. Tenders received by Secy., R. C. Desrochers, Ottawa, Dept. Pub. Wks., until June 4th. Plans at office of J. G. Sing, Confederation Life Bldg., Toronto. H. J. Lamb, District Engineer, Windsor, and postmaster, Owen Sound.

Port Elgin, Ont.

Tenders received by Secretary-treas., Dennis Izzard, Port Elgin, until May 15th. A—Reconstruction of 2 bridge span. B—Construction of concrete piers. A marked cheque for 5 per cent. made payable to the Treas. of the County of Bruce must accompany each tender. Plans at the office of Engineer R. McDowall, Owen Sound.

Sault Ste. Marie, Ont.

Dredging tenders received by Secretary, Department of Public Works, R. C. Desrochers, Ottawa, until May 20th. Specifications at the secretary's office, must include the towing of the plant to and from work. Dredges and tugs registered in Canada. Contractor to be ready to begin within 30 days after accepting tender.

Approach to wharf tenders received by Secretary R. C. Desrochers, Ottawa, Ont., Dept. Public Works, until June 4th. Plans at office of J. G. Sing, Confederation Life Bldg., Toronto. H. J. Lamb, District Engineer, Windsor and Postmaster Sault Ste. Marie.

Winnipeg, Man.

Cement culverts on Pemonia Highway. Tenders called. Plans at office of Prov. Engineer., Dept. Public Works.

CONTRACTS AWARDED

Little Lameque, N.B.

Crib work and wharf. Cost $21,890 for Dominion Government, Ottawa. Secretary, R. C. Desrochers. General contractors, H. Beresford, St. John, N. B. To be extended in the water to depth of [illegible] feet.

Maple Rapids, Que.

Waterways to cost $[illegible]. Quinze Lake. General contractor, Morrow & Beatty, Peterboro. Dam and sluiceways to impound water during floods and regulate flow during dry seasons part of scheme for the general storage of waters of the Ottawa River. Secretary, R. C. Desrochers, Ottawa

St. Maurice River, Que.

Dredging for Dominion Government, Ottawa. Gen. contractor, Antoine St. Pierre, Three Rivers, Que. Approximately 60,000 cubic yards to be cleared. Contract price 12c. per cubic yard.

Toronto, Ont.

Dredging approach channel to ferry wharves, Toronto Bay, Hanlan's Point. Contractor, General Construction and Dredging Co. President, W. A. Warren, Warren Bros., 87 Front street W. R. C. Desrochers, sec. Dept. Pub. Wks., Ottawa.

Public Buildings, Churches, Schools, etc.

Hamilton, Ont.

Isolation Hospital to cost $100,000. Medical Health Officer, Dr. J. Roberts. Chairman of Board, W. Farrar, 7 Market Sq. Mayor, George H. Lees.

Hospital to cost $32,000. Chairman Hospital Board, H. H. Pratt, James St. N. Chairman Board of Control, Mayor G. H. Lees. Architect, H. H. New, James street N., to complete plans and call for tenders.

Public Library Architect A. W. Peene 2 Hughson street west, will receive tenders. Librarian, Adam Hunter, Main street.

Club house to cost $10,000, near Ancaster, for the Country Club. Interested, Geo. Lynch-Staunton, Bank of Hamilton Bldg., Hamilton. Architect, J. A. Armes, Federal Life Bldg., Hamilton. Rustic stone work. New set of plans being prepared.

Jordan, Ont.

School addition, cost $7,000, Plans being prepared, brick construction.

London, Ont.

Garbage incinerator, cost $50,000. Mayor, C. M. R. Graham. City Engineer, Geo. Wright. Plans called shortly for equipment.

Meaford, Ont.

Armouries to cost $15,000. Owner, Dominion Government Dept. Militia. Architect, Philip Palin, Collingwood. Tenders received by Deputy Reeve Thom of Collingwood. 2-sty., 107 x 40.

Mitchell, Ont.

Church to cost $10,000. German Lutherans. Pastor, Rev. Theo. Bloedel. 2-sty. and basement, 35 x 60, brick and stone construction. Plans to be prepared.

Montreal, Que.

School on Cedar avenue, for The Children's Memorial Hospital. Treasurer, C. J. Binmore, 197 Peel street. $5,000 on hand to start work.

Club House and Curling Rink to cost $20,000 on St. Matthews street. for St. Andrew's Club. President, W. M [illegible] street. Architect, McDowell & Henderson, Guy street. Tenders called at once.

Moose Jaw, Sask.
Theatre to cost $100,000, for W. B. Sherman, Calgary. A site opposite the Y.M.C.A. purchased. Plans prepared at once. Building to seat 1,200.

New Westminster, B.C.
High School to cost $100,000, Tipperary Park. Architect, Gardner & Mercer. Tenders called.

Orillia, Ont.
Armouries to cost $40,000. Dominion Government. Architect, David Ewart, Public Works, Ottawa. Plans and specifications at the Dept. of Militia and postmasters office Orillia.

Owen Sound, Ont.
School on 4th avenue. Architect, Foster & Clarke, Owen Sound. Tenders close May 20th. Address Chairman Bd. of Education.

Pembroke, Ont.
Carnegie Library. Architect, F. C. Sullivan, Castle Bldg., Ottawa. Tenders up to May 18th. A. J. Fortier, Town Clerk.

St. Lambert, Que.
Additions to St. Lambert Academy. Architects, Hutchison, Wood & Miller, Royal Ins. Bldg., Montreal, have prepared plans.

Saskatoon, Sask.
Three schools to cost $36,000 for Brock, Brownlee & Diamond School districts. Architects, Storey & Van Egmond, Regina, Sask.

South Porcupine, Ont.
Lockup. Sec., H. F. McNaughton, Dept. Public Works, will receive tenders until May 22nd. Cheque payable to Minister of Public Works to accompany each tender. Plans from Cook & Mitchell, South Porcupine, or at the Dept. of Public Works, Toronto.

Walkerville, Ont.
Hall on Victoria road, for I.O.O.F. Site purchased and plans considered.

Winnipeg, Man.
Court House. Plans being prepared. Owner, Dept. of Public Works. Architect, V. W. Horwood, Fort street.

Exhibition Buildings to cost $10,000. City Council to control work.

CONTRACTS AWARDED

Dundas, Ont.
Additions to Sunday School to cost $3,000, for the Methodist Church Board. Secretary, W. H. Moss, Dundas. 2-sty., brick construction.

Grand Forks, B.C.
Post Office to cost $45,000 for Dominion Government, Postal Dept. Gen. contractor, B. LeQuine, Grand Forks. Change in plans allows for tower, bell and striking clock.

Hamilton, Ont.
Salvation Army Citadel to cost $9,000, cor. Barton and Leeming streets. Architect, D. N. Miller, 24 Albert St., Toronto. General contractor, E. S. Kerr, 408 Garth street. 1-sty. and basement, 31 x 74, stone and brick construction.

Lucille, P.Q.
Dominion Building (Quarantine station) to cost $24,500, for Dominion Government, Ottawa. Architect, D. Ewart, Dept. of Public Works, Ottawa. General contractor, Jos. Gosselin, Levis Que.

Nurses Cottage Laboratory to cost $5760; Quarantine Station to cost $4,240 for Dominion Government, Ottawa. Architect, D. Ewart, Government Office, Ottawa. Gen. contractor, Mount Royal Construction Co., 62 St. James street, Montreal.

Maisonneuve, Que.
School for R. C. School Commissioners. Architect, C. A. Reeves, 58 St. James street. Electric wiring, R. H. Tarin, 203 First avenue, Maisonneuve. Plastering, E. D. Tessier, 270 William David street. 3-sty. and basement, 185 x 70, stone and brick construction.

Midland, Ont.
Roman Catholic Church to cost $50,000. Architect, J. W. Siddall, Janes Bldg. Toronto. General contractor, Murphy & Owens. Stone construction.

Montreal, Que.
School and public chapel, cost $17,500, Berri street. Alterations for School Commissioners of the Municipality of Youville. Architect, C. St. Jean, 62 James street. General contractor, A. Lescarbeau, 62 15th ave., Lachine. Two storeys, 60 x 60, stone and brick. Plans ready.

Moving picture theatre to cost $12,000, 336-8 St. Catherine street, for Estate G. W. Stephens, 18 Alexis street. Architect, H. C. Stone, 84 St. Francois Xavier street. 1-sty. and gallery, 38 x 91, brick construction. Work started.

Ottawa, Ont.
Church to cost $13,000, Lyan street, S. H. McDowall. Trustee. Architect, C. P. Meredith, Sparks street. General contractor, Richards & Co. 28 x 61, solid brick construction.

Outremont, Que.
Church to cost $30,000, Hutchison and St. Viateur street, for The McVicar Memorial. Architect, McVicar & Heriot, 104 Union avenue, Montreal. Roofing, plastering and painting contracts let. Electric wiring, C. Lapierre, 419 Lindsay Bldg., Montreal. Plumbing, Selkirk Bros., 109 St. Viateur street. Heating not awarded.

Port Stanley, Ont.
School to cost $210,376. General contractor M. H. Hogan, Port Colborne, Ont.

Sarnia, Ont.
Repairs to Court House, cost $15,000, Christina street. Architect, R. W. Fawcett. Mason contractor, F. Gutteridge. Carpentry, D. W. Griffin. Painting and iron work, W. J. Barrie. Heating, A. Joss, all of Sarnia.

Saskatoon, Sask.
Church, cost $10,000, 10th street, for Thompson, Daniels & Colthurst. General contractor, F. C. Taylor. Frame and concrete.

Stratford, Ont.
School to cost $25,095. Architect, Grayson, Brown & Fryer, Hamilton. General contractor, W. H. Pulleyblank, St. Marys. Plumbing and heating, McDonald & Henry, Stratford. 2-sty., stone and brick construction.

Toronto, Ont.
Institute Emily street to cost $30,000, for St. Andrews Presbyterian Congregation. Architects, Curry & Sparling, 90 Yonge street. Mason, Jas. A. Wickett, Ltd., 678 Broadview avenue. Carpenter, Wm. Munro & Son, 76 Spadina avenue.

West Toronto, Ont.
Sunday School for Davenport Methodist Church. Architect, D. E. Smith, Victoria street, Toronto. Secretary, J. W. Lawson, 115 Ford street, West Toronto. Mason, Teagle & Son, 55 Boswell avenue. Carpenter, T. J. Sproule, 54 Shanley street. Plastering, A. Petrie & Co., 351 Dupont street. Roofing, Geo. Sinclair, 307 Clinton street. Plumbing, J. R. Seager, 799 College street. Wire, Keith & Fitzsimmons, 111 King W. Heating contract still open.

Residences

Calgary, Alta.
Residence to cost $5,000, Madison street. Architects and contractors, A. O. Mabee & Co., 32 Elma Block. 2-sty., 23 x 26, brick veneer construction.

Apartment house to cost $8,000, for the Colgrove Land Co., Crown Bank Bldg. 2-sty., 36 x 56. Plans being prepared.

Forest, Ont.
Parsonage to cost $4,500, for Methodist Congregation. 2-sty., 28 x 40, stone and brick construction.

Ft. William, Ont.
Residence to cost $15,000, Norah St., for W. C. Lillie. Architect, R. E. Mason. 2½-sty., brick and stone construction. Tenders called.

Glencoe, Ont.
Rectory to cost $6,000 for the Anglican Congregation. Rector, Rev. C. H. Owen. 2-sty., brick and stone. Plans prepared at once.

Hamilton, Ont.
Twelve-room apartment house, cost $10,000, Bold street, for J. C. Sealey, Architects, Watt & Blackwell, Lister Chambers. Tenders close May 22nd.

Two residences to cost $5,000 on Elgin street, for S. B. Cunningham, President Brewing Association, Bay street N., Architects, Stewart & Witton, 2 Hughson street S. Brick construction. Plans ready.

London, Ont.
Residence to cost $12,000, for H. E. Boomer, 447 Colborne street. 2-sty., red pressed brick and stone construction. Plans prepared shortly.

Montreal, Que.
Residence to cost $6,000 for A. Desrochers, 378 Desery street. 3-sty., 50 x 42, brick construction.

Montreal West, Que.
Residence for Lorne Crawford, 35 Seymour avenue, Montreal. Architect, McDowell & Henderson, 444 Guy street. 2-sty., 30 x 40, brick construction. Tenders received until May 23.

Ottawa, Ont.
6 residences to cost $10,000 on King Edward avenue, for S. Diamond, 269 King Edward avenue. 2-sty., 102 x 40, brick veneer construction, concrete brick veneer construction. Plans ready.

Dwelling to cost $3,500 on Cambridge street. Builder and owner, R. McKinistry, 91 2nd avenue. 2-sty., 23 ft. 6 in. x 39 ft. Plans ready.

Renfrew, Ont.
Residence to cost $5,000 on Horton street, for Mrs. A. Grant. Architect

J. A. Jamieson. 2½ storeys, 32 x 38, solid brick. Work to be let by day labor.

Toronto, Ont.

Addition to residence, cost $4,000, for T. M. Brown, 427 Avenue road. Architect, E. R. Conlan, 1552 Queen street W. Two storeys and attic, brick and stone. Tenders received for all trades but carpentry and masonry.

Residence, Cost $4,000, Ellsworth ave., for Elliott & Brown, 8 Newsham ave. Two storeys, brick construction. Tenders open, all trades but carpentry and masonry.

Residence to cost $5,000, High Park avenue, for R. Hickerson, 310 High Park avenue. Architect, Redmond & Beggs, Kent Building. 2-sty., 36 x 43 Tenders open.

Residence to cost $4,000, 601 Crawford street. Builder, T. Thompson, 847 Bloor street west. Architect, J. M. Cowan, 65 Adelaide street E. 2½-sty., brick and stone. Tenders open.

1 pair dwellings to cost $5,000, S.S. Garnock avenue, for Tickner & Sutherland, 84 Victoria street. 2½-sty., 32 x 42, brick. Tenders open, roofing, wiring and concrete work.

Residence to cost $5,000, St. Andrews Gardens, for Jas. Simm, 372 Markham street. Architect, F. R. Berry, 1107 College street. 2-sty. and attic. Tenders open.

Apartment house to cost $25,000, Gloucester near Church street, for J. M. Cowan (in trust) 65 Adelaide street. Architect and builder. Three storeys, brick and stone. Tenders called.

2 pair semi-detached dwellings to cost $10,000 on Campbell avenue, for John Boland, 570 Brock avenue. Architect, J. M. Cowan, 65 Adelaide street E. 2-sty., brick and stone. Tenders received by owner after May 24th.

Residence to cost $5,000 on S.S. Edgar avenue, for Wm. Smart, 649 Shaw street. Architect, F. Berry, 1107 College street. 2½-sty., brick. Tenders open for all trades but carpenter. Received by owner.

Residence to cost $5,000 on Bathurst street, for W. J. Sinden, 4 Concord ave. Architect, J. A. Harvey, Manning Chambers. 2½-sty., brick. Plans ready.

Residence to cost $7,000, for D. A. Peacock, 577 Church street. Architect, and builder, J. A. Harvey, Manning Chambers. Brick. Plans under way. Tenders called next week.

Apartments to cost $20,000, for Mrs. F. B. Pearson, c/o Mrs. Clow, 159 Bloor street east. Architect, J. M. Harvey, Manning Chambers. 3-sty., brick and stone. Tenders called.

Residence to cost $4,000 on Huron st., for J. Samuel, Huron and St. Patrick streets. Architect, Leonard Foulds, 21 Leader Lane. Builder, W. H. Martin Co., 28 Harcourt avenue. 3-sty., 30 x 30, brick. Tenders open for plumbing, heating and wiring, received by builder.

Residence to cost $4,000 on S.S. Edgar avenue, for R. Mowbray, 690 Indian road. Architect, J. H. Stanford, Bloor & Ossington avenue. 2½-sty., brick. Tenders open for plumbing, heating and wiring.

Residence to cost $3,500 on Hambly avenue, for A. M. Dunn, 33 Main street. Architect, E. R. Conlan, 1552 Queen W. 2-sty., brick construction. Tenders open.

Two detached dwellings to cost $5,000 on Lansdowne avenue, for H. Buie, Esq., 374 Crawford street. Architect, J. Gladwin Hedges, 34 Yonge street. 2-sty., 16 x 40. Plans ready. Tenders received by owner.

1 pair residences to cost $5,000, Hogarth avenue, for S. J. Gee, 452 Grace street. 2-sty., brick and stone. Tenders open all trades except carpentry.

Addition to residence to cost $4,000, S.S. DeLisle street, for Dr. A. R. Gordon, 345 Bloor west. Architect, F. S. Baker, Traders Bank Bldg. Builder, Harvey Jennings, 49 St. Clair west. Brick and stone. Tenders open plumbing, heating, wiring and roofing.

Residence to cost $5,000, Indian rd., for David Holland, 588 Lansdowne ave. Architect, D. E. Smith, 77 Victoria st. 2½-sty., 24 x 37, brick and stone. Tenders close May 18th.

Apartments to cost $6,000, Markham street, for A. P. Herbert, 59 Victoria st. Architect, J. M. Cowan, 65 Adelaide st. E. 2-sty., 40 x 60, brick construction. Plans prepared.

Residence to cost $25,000, for Major J. A. Murray, Queen and Lakeview ave. Architect, Page & Warrington, 207 Confederation Life Bldg. 2½-sty., brick. Tenders open.

Winnipeg, Man.

Residence to cost $10,000, for F. B. Francis, 482 Wardlaw avenue. Architect, Ross & McFarlane, Union Bank Bldg., Winnipeg. 2½-sty., 28 x 40, stone and cement stucco construction. Plans being prepared.

CONTRACTS AWARDED

Dorchester, Ont.

Residence to cost $4,000 for Dr. P. Baughart; 2-sty., 28 x 40, brick construction. Work started.

Maisonneuve, Que.

Flats to cost $10,000, 5th avenue. Owner and general contractor, A. D. Tremblay, 86 Forsyth street. 3-sty., 50 x 42.

Flats to cost $11,000, Orleans street. Owner and contractor, J. T. Morin & Co., 2144 Ontario E. 3-sty., 45 x 45, brick construction.

Flats to cost $5,000, William David street, for A. Latour, 62 Darling. Gen. contractor, P. Meloche, 122 Fourth ave. 3-sty., brick construction.

Flats to cost $4,000, Lafontaine street. Owner and contractor, A. Marchessault, 207 Desjardins street. 3-sty., 26 x 46, brick construction.

Flats to cost $15,000, Lafontaine St. Owner and contractor, J. L'Archeveque, 18 Lafontaine street. 3-sty., 54 x 40.

Flats to cost $5,000, 1st avenue. Owner and contractor, Alderic Lemay, 189 St. Catherine street. 3-sty., 26 x 50.

Flats to cost $6,000, Fifth avenue, for Mathias Lalande, general contractor, 287 Fifth avenue. 3-sty., 26 x 42, brick construction.

Montreal, Que.

Three flats, cost $5,500, Beaudry St., for D. Allard, 213-B Beaudry street. General contractor, Richer & Bro., 2607 St. Hubert street. Three storeys, 29 x [illegible]

Two residences, Notre Dame De Grace street, for Z. Limoges, 614 St. Paul street. Architect, G. A. Monette, 97 St. James street. General contractor, E. Dussault, 85 LaSalle street. Two storeys, 25 x 72, brick and stone construction.

Residence, cost $7,500, St. Philippe street, for L. N. Noiseux, 599 Notre Dame street west. General contractor, W. Tandy, 91 Adam street, Viauville. 3-storeys, 53 x 38, brick construction.

Nine flats, Casgrain street, cost $6,500, for Jos. Sigouin, 2029 St. Lawrence Blvd. General contractor, P. E. Ranillier, 2108 St. Andre street. Three stys., 50 x 46.

Flats, cost $10,000, Esplanade ave., for Arthur Bastien, 243 Querbes street. Architect, Dalbe Viau, 76 St. Gabriel street. General contractor, E. Lamontagne, Montreal. Three storeys, 50 x 70, brick construction.

Flats, on Bordeaux street, cost $3,200. Owner and builder, A. Dagenais, 908 Bordeaux street. Two storeys, 25 x 40, brick and stone.

Flats, St. Urbain street, cost $3,800. Owner and contractor, Ulric Dubois, 2111 St. Urbain street. Three storeys, 25 x 40.

Flats, Bagg ave., cost $10,000. Owner and contractor, A. Charbonneau, 2145 St. Urbain street. Three storeys, 75 x 54, pressed brick construction.

Residence to cost $12,000 Fort street. Contractor, L. J. St. Pierre, 922 St. Catherine street. 3-sty., brick and stone construction. Work started.

Flats to cost $5,000, Chabot street, for R. Simard, 1315 Papineau street. Contractor, A. Champagne, 1182 Chabot st. 2-sty., 50 x 42.

Flats to cost $5,600, Ryde street, for D. Bourgois, 408 Charlevois street. Gen. contractor, J. B. Marleau & G. Deslages, 37 Reille St. Ville, St. Paul. 3-sty., 52 x 40.

Residence to cost $8,200 for Jos. Mathieu, 628 Lagauchetiere. Contractor, Art Roberge, 786 Garnier street. 3-sty., 36 x 40.

Residence to cost $3,800, Stadacona street for Ard Amyot, 207 Joliette st. Gen. contractor, J. A. Durocher, 80 Chambley. 3-sty., 24 x 38.

Residence to cost $17,000, Mance and Prince Arthur, for Mrs. J. E. Cormier, 271 Mance street. Architect, Chas. Bernier, 70 St. James street. Contractor is owner. 3-sty., 77 x 54, stone and brick construction.

Dwelling to cost $7,000, on Atwater street, for A. E. Blanchard, cor. St. Antoine street and Atwater avenue. Gen. contractor, Jas. Marcotte, 565 St. Antoine street. Carpenter, S. Brais, 114 Gertrude street, Verdun, Que. 3-sty., [illegible]

Residence to cost $7,500, Casgrain st., for A. Piche, 1894 Henri Julien street. Gen. contractor is owner. 3-sty., 63 x 45.

Residence to cost $11,000 on St. Andre street, for D. Riopel, 527 Rachel st. General contractor is owner. 3-sty., 54 x 36.

[illegible] W. Clarke, 366 St. Catherine street. Architect, McDowell & Henderson, 441 Guy street. Mason and plasterer, William Irving, Guy Block, St. Catherine street. Plumbing and Heating, Selkirk Bros., 109 St. Viateur. Roofing, Westmount Plumbing and Heating Co., Ltd., 4278 St. Catherine street, Westmount. Wiring, Star Electric Co., 876 St. Catherine west. 2-sty., 25 x 47.

Residence to cost $3,500, Davidson st., for S. Lafrance, 135 Davidson street. General contractor is owner. 3-sty., 32 x 40, brick construction.

Residence to cost $10,000, St. Luke street, for Z. & J. St. Pierre, 105 St. Luke street. Contractor is owner. 3-sty., 32 x 38, brick and stone construction.

Residence, 68 Ontario street, for Gordon W. McDougall, 607 Quebec Bank Bldg. Architect, Robt. Findlay, 10 Phillips Place. General contractor, mason and brickwork. Jno. Stewart & Co., Bethune street. Carpentry, Geo. Roberts, 79 Lagauchetiere street. 3-sty., 40 x 54, cut stone and pressed prick construction.

Extension to apartments on University street, for The Hart Estate, 33 St. Nicholas street. Architect, MacVicar & Heriot, 104 Union avenue. General contractor, Gray & Wighton, 244 Pine avenue. 4-sty., 21 x 16, brick and stone construction.

Residence to cost $20,000 on Fort st., for Z. & J. St. Pierre, 105 St. Luke street. Architects and contractors. 3-sty., 45 x 62, prick and stone construction.

Three flats to cost $3,000, on Cartier Park, for M. Tessier, The Cedars, Que. Architect, R. Charbonneau, 15 St. James street. Contractor owner. 2-sty., 21 x 45, stone and wood construction. Plans ready.

Dwelling to cost $25,000, Cedar ave., for J. Douglas Morgan, M.D., Union ave. Architect, Morgan Co.'s Staff, Beaver Hall Hill. Work started.

Flats to cost $5,000, St. Hubert street. Owner and contractor, G. Zudick, 829 St. Urbain street. 3-sty., 25 x 70, brick encased construction.

Flats to cost $15,000, Plessis street, for T. Beaubien, 80 Plessis. Contractor, Jas. Renaud. 2-sty., 22 x 51, brick construction.

Dwelling to cost $4,300, Aylwin st. Contractor, Chas. Lortie, 356 Letourneux. 3-sty., 25 x 42, pressed brick construction.

6 flats to cost $7,500, Champlain street, for Mrs. E. Lemieux, 321 Champlain street. Architect, Mr. Courtemanche. Gen. contractor, B. Despatis, 2073 Christophe Colomb street. 3-sty., 40 x 63, brick construction.

North Battleford, Sask.

Residence to cost $5,000, Riverview street, for S. Ferrie. Architect, Stephenson & Evans. General contractor, Matthews & Bundock, 2-sty., 30 x 26.

Outremont, Que.

Residence to cost $18,000, St. Catherine road, for C. Legault, 110 Park ave. Architect, MacDuff & Lemieux, University street. Contractor, H. Martin, 438 St. Antoine street. Brick construction.

Residence to cost $5,000, 83 de l' Epee, for David Abel, 2159 St. Urbain street. Contractor, T. Mooney, 2339 Esplanade avenue. 2-sty., 24 x 43, pressed brick construction.

Cottage, De L'Epee street, cost $5,800, for O. Lepage, 237 Bloomfield. General contractor, Arsene Frenette, 212 Fabre street. Two storeys, 25 x 40, brick and stone construction.

Residences to cost $8,000, Durocher. Owner and general contractor, A. Cloutier, 374 Gilford street. 2-sty., 27 x 76, brick construction.

Residence, Querbes street, cost $4,000. Owner and contractor, Arthur Bastien, 178 Fairmount avenue. Architect, J. D. Viau, 75 St. Gabriel street. Two stys., 26 x 56.

Two flats, Bloomfield ave., cost $7,000. Contractor, B. Damiens, 894 Mount Royal ave. Architect, J. A. Godin, 269 St. Denis street. Two storeys, 27 x 50, stone and brick.

Ottawa, Ont.

Dwelling to cost $4,000 on Somerset street, for Eugean Bouttellie, 295 Clarence street. Contractor is owner. 3-sty., 35 x 40, double brick veneer construction.

Dwellings to cost $4,500, Muchmore street, for A. J. Cameron, 104 1st ave. Mason work, Boyd Bros. Carpenter work, Amos. Burton. 2-sty., 25 x 32, cement block construction.

Apartments to cost $5,300, Somerset street, for D. Fraser, O'Connor street. Architect, Horwood, Taylor & Horwood, 130 Sparks street. General contractors, Featherston & Martin. Solid brick construction.

Quebec, Que.

Apartment house to cost $175,000, 114 Grand Allee, for Grand Allee Apartment Co. Ltd., Que. Architect, McDowell & Henderson, 444 Guy street, Montreal. Electric lighting fixtures, E. C. White & Co. Ltd., 444 Guy street, Montreal. House telephones, Quebec Electric Co., Quebec.

Renfrew, Ont.

Residence to cost $3,200, Ann street, for W. Smith. Architect and contractor, J. A. Jamieson. Excavation, mason, carpenter and roofing, W. A. Moore. Painting and glazing, Syd. Jennings. Plumbing and heating, Jno. Conley. 2½ sty., 25 x 30.

Residence to cost $2,500, Ann street, for Wm. Burwell. Architect and general contractor, J. A. Jamieson. Excavation, mason and carpenter work, W. A. Moore. Painting and glazing, Syd. Jennings, Renfrew. Plumbing and htg., Jno. Conley, Renfrew. Roofing, H. Coolicom. 2½-sty., 24 x 30.

Sarnia, Ont.

Residence, Charlotte street, cost $8,000, for David Milne. Architect, R. W. Fawcett. General contractor, Robert Irvine. Two storeys, brick and stone.

Toronto, Ont.

Six suite apartments to cost $12,000, for J. H. Adams, 25 Maynard avenue. Architect, Edwards & Saunders, 18 Toronto street. Mason, Thomas Filey. Carpenter, T. Bagshaw & Son, 477 West Marion street. Other contracts open.

Residence to cost $3,800, Mellville Park Boulevard, for Mrs. A. King, 997 College street. Builder, H. J. & W. F. King, 997 King street, doing masonry and carpentry work by day labor. Other trades open for tender. 3-sty., 30 x 48, brick and stone construction.

Apartments to cost $28,000, King and Jamieson, for S. King, 185 Spadina ave. Architects, Redmond & Beggs, Kent Building, Toronto. Mason, Royson & Co., 144 Harrison St. Plumbing, heating and electric light, Keith & Fitzsimmons, 111 King W. Steel, McGregor & McIntyre, 79 Pearl St. Safes, Murphy, Toronto street. Tenders open for vacuum cleaners, tiling, cooling plant.

Residence to cost $6,500, High Park avenue, for C. F. Matthews, 788 Dundas street. Architect and carpenter, A. J. Rattray, Stair Bldg. Mason, R. H. Harman & Son, 156 Dupont street. Other trades still open.

Residence to cost $6,000, Glencairn avenue, North Toronto, for J. A. Northey, 42 Forest Hill road. Architect, Edwards & Saunders, 18 Toronto street. Builder, W. E. Simmons & Co., Hawthorne avenue, Eglinton. 2½ storeys, brick and stucco.

Dwelling to cost $5,000 on W.S. Indian road, for G. D. Bly, 284 Gladstone avenue. Architect, J. H. Galloway, 23 Toronto street. Builder and general contractor, C. C. Fry, Oakmount Boulevard. 2-sty and attic.

Verdun, Que.

Flats, Verdun street, cost $8,500. Owner and contractor, Dalma Lanthier, 251 Church street. Three storeys, 50 x 40, brick encased construction.

Twelve flats, cost $18,000, Ethel St., for Henri Brasseau, Hickson avenue. General contractor, J. O. Hamelin, 246 Church ave. Three storeys, 52 x 67, brick encased construction.

Six flats to cost $10,000, Evelyn st. Owner and contractor, Treffle Valiquette, 256 Church avenue. 3-sty., 50 x 40.

12 flats to cost $15,000, Galt avenue. Owner and contractor, Z. Royal, 228 Galt avenue. 3-sty., 40 x 75, brick construction.

24 flats to cost $30,000, First avenue. Owner and contractor, D. Lanthier. 3-sty., 200 x 40, brick encased construction.

Westmount, Que.

Residence to cost $17,000, Westmount Blvd., for Robertson MacAulay, c/o Sun Life Assurance Co., 124 Notre Dame street, Montreal. Architect, R. Findlay, 10 Phillips Place. Brick and masonry, Robertson Bros., Chestnut avenue. Carpentry, Simpson & Peel, 10 Benoit street. Iron Work, Dominion Bridge Co. Ltd., Lachine. Plumbing and heating, T. Lessard & Sons Ltd., 191 Craig street East. 3-sty., 37 x 73.

Residence, Cambridge avenue, for N. S. Croker, Stanley and St. Catherine st. Architect, Wright & Son, 204 St. James street. Masonry and stonework, J. Morrison, 207 Guy street. Carpenter, T. S. Hudson & Co., 612 Bd. of Trade. 2-sty., 34 x 56.

Business Buildings and Industrial Plants

Calgary, Alta.

Warehouse, 10th ave. west, cost $30,000, for Messrs. McPherson, 8th ave. west. Three storeys, 50 x 130, brick construction. Plans considered.

Business block, cost $12,000, for F. Kinney. 219 18th ave. east. Architects, Lyon & Major. Two storeys, 50 x 50. Plans ready.

Stores and apartments, 17th ave., cost $15,000, for J. Bourne, Bourne Block, 14th street west. Architects, Burrows & Richards, Calgary. Two storeys, 60 x

50, brick veneer construction. Plans ready.

Block—6 stores and theatre to cost $12,000 for Mr. Suppy, Travis Blk. Architect, Mr. Tosh. 1-sty., 100 x 120, brick construction. Plans being prepared.

A warehouse will be erected on 11th avenue and 2nd street west for Massey Harris Co. 100 x 130, with trackage facilities.

Forest, Ont.

Business block to cost $15,000 for Wm. Lochead. Plans under way and tenders called shortly.

Fort William, Ont.

Hotel to cost $18,000, Simpson street, for Lacey West Hotel. Architect, C. Ward. 3-sty., 25 x 100, solid brick construction. Plans ready.

Manufacturing plant to cost $1,000,000 for The Canada Car & Foundry Co. of Amherst, N.S., and Montreal, to be established here. Work to commence in 6 months, in full operation in 30 months. 1000 men employed. N. Curry, representative.

Glencoe, Ont.

Factory for the Lewitt Knitting Co., Glencoe. Manager, Mr. Lewitt. Plant to be moved to Amherst, Ont. Addito be moved to Amherstburg, Ont. Additions to be made and new machinery installed.

Hespeler, Ont.

Stove and furnace foundry, cost $8,000, for Hull Zyrd Co., Hespeler. One storey, 80 x 100, brick construction. Plans considered.

Meaford, Ont.

Brick plant for The Meaford Brick Co. Manager, J. O. Sharpe, 14 King St. E., Toronto. Architects and Engineers, Trout Line Engineering Co., Chicago, Ill., and the Hare Engineering Co., 14 King street east, Toronto. Capacity, 50,000 bricks per day. Plans being prepared.

Medicine Hat, Alta.

Bank building, Toronto and Fourth ave., for Union Bank of Canada, Winnipeg. Architect, W. T. Williams, Medicine Hat. Three storeys, 25 x 70, pressed brick and Bedford stone construction. Plans ready.

Midland, Ont.

Sash and door factory to cost $12,000 for Benson & Bray. 2-sty., 240 x 70, brick construction. Tenders called.

Montreal, Que.

Office building to cost $35,000, forBank British North America, St. James street, Montreal. Architect, Barrott & Blackader, New Birks Bldg. 6-sty., 68 x 95, granite construction. Plans accepted and tenders called shortly.

Ottawa, Ont.

Commercial Building on Sparks st., for Senator Belcourt. Architect, W. E. Noffke, 26 Central Chambers. 3-sty., 70 x 100, steel and concrete construction. Plans ready.

Shop to cost $5,000, Dalhousie street. Owner and contractor, J. A. N. Mercier, Dalhousie street. Brick veneer construction.

Prince Albert, Sask.

Office building to cost $50,000, cor. Central avenue and 11th street, for Chas. McDonald. Architect, Creighton & Crowther, Prince Albert. 3-sty., fireproof construction. Plans being prepared.

Port Elgin, Ont.

Brush factory and extensions for Stevens Hepner & Co., Market street. 3-sty., brick construction. Plans being prepared.

Renfrew, Ont.

Departmental Store. for I. E. Pedlow. Architect, W. E. Noffke, 26 Central Chambers, Ottawa. Three storeys, 60 x f05, steel and concrete construction. Plans ready.

Saskatoon, Sask.

Stores and offices to cost $50,000 for Great Dominion Land Co. Architect, Thompson Daniels & Colthurst. Reinforced concrete construction. Tenders called.

Factory to cost $50,000 for J. J. Case Thrashing Co. Reinforced concrete construction. Plans ready.

Department store, 3rd and 21st streets, for Dr. J. H. C. Willoughby and A. J. E. Summer. 4-sty. with basement and sub-basement. 130 x 100. Plans being prepared.

Planing mill, Nutana street, for Doak Lumber and Manufacturing Co., Saskatoon. 2-sty., frame and brick veneer construction. Plans ready.

Stellarton, N.S.

Woollen mill for Acadia Coal Co. to cost $350,000. Negotiations are on for site and tax exemptions. Particulars from town clerk.

Bakery for Lynch Bros., Sydney. 2-sty., brick construction with basement, 60 x 90. Plans under way.

Toronto, Ont.

Factory to cost $12,000, S.W. corner Queen and John street, for L. J. Scheimman, 121 Grenadier Rd. Architect, J. H. Galloway, 23 Toronto street. 3-sty., 55 x 65, brick and mill construction. Tenders open.

Office building to cost $33,000, Victoria and Richmond streets, for Robins Ltd., 22 Adelaide east. Architect, Jno. M. Lyle, 14 Leader Lane, 2½-sty. and basement, brick, stone foundation, and artificial stone, structural steel. Work is started.

3 att. stores and residence to cost $5,000 (1048-52 Dovercourt road for J. Howard, 331 Jarvis street. Architect, Thos. Hancock, 836 Dovercourt road. 2-sty. and basement, 46 x 48, brick. Tenders open for all trades. Received by owner.

Walkerville, Ont.

Bank, corner Victoria road and Wyandotte road, for the Merchants Bank of Canada. Site purchased. Work to start at once.

Westmount, Que.

3 stores and offices on St. Catherine and Green avenue, for G. Rubinovitch, [illegible] Cadieux street. Architects, [illegible] & Decary, LaPrairie Bldg., have plans in preparation.

CONTRACTS AWARDED

Hamilton, Ont.

[illegible] apartments, cor. King and [illegible] streets, cost $[illegible], for Bennett & Thwaites, 14 Holden ave. Owners are general contractors and will sub-let.

Factory to cost $23,000 on Lottridge street, for The Magnet Cream Separator Co. Architect, Prack & Perrine, Gilkinson street. General contractor, H. G. Christman & Son, Gilkinson street.

Machine Works to cost $14,000, for Berlin Machine Works, Berlin avenue. Manager, G. W. Robinson. Architect and general contractor, W. H. Yates, 24 Leeming street.

Halifax, N.S.

Business building to cost $7,000 for Clayton & Sons, Barrington street. General contractor, Thomson & Theakston, 90 Hollis street. 3-sty., 28 x 60, stone and brick construction.

Ingersoll, Ont.

Carriage shop to cost $6,000, Charles street, for Robert Staples. Red brick construction. Work started.

Maisonneuve, Que.

Stores and 2 flats to cost $10,000, Notre Dame, for Madame H. Dubois, cor. Notre Dame and 3rd avenue. Architect, R. Montbriand, 230 St. Andre street. General contractor, Trudel & Co., 377 Notre Dame street. 3-sty., 27 x 60.

Montreal, Que.

Store and dwelling, Fifth ave., cost $3,500, for L. J. Marchand, Ville Emard, General contractor. Two storeys, 61 x 60.

Alterations, stores, 295-301 Montcalm, cost $7,000, for J. B. Letendre, 567 St. Catherine street. General contractor, Wm. Rouin, 851 Marie Anne street. 3 storeys, 43 x 78, brick construction.

Store to cost $4,200, 407 St. Catherine street, for Standard Realties Ltd., 207 St. James street. Architect, House of Browne Ltd. General contractor, J. Kennedy, 141 St. Peter street. Carpenter, T. J. Tobin, 506 Huntley street. Painting, J. M. Arcand, 51 Beaver Hall Hill, Montreal. Roofing, Richardson Simard & Co., 129 Elgin street. 2-sty. and basement, 22 x 73.

Store and dwelling to cost $12,000, Atwater avenue, for A. E. Blanchard, St. Antoine and Atwater avenue. General contractor, Jas. Marcotte, 565 St. Antoine street. Carpenter, S. Brais, 114 Gertrude street, Verdun, Que. 3-sty., 45 x 10.

Warehouse repairs to cost $20,000, for Grey Nuns. General contractor, F. A. Grothe. 6 Cuthbert street. 4-sty. and basement, 50 x 130.

Warehouse to cost $41,620, 71 William street, for F. C. Skelton, Commercial Union Bldg. Architect, P. J. Turner, 116 Bd. of Trade. General contractor, Atlas Construction Co., 745 St. Catherine street. Sprinkler system, Rockwood Sprinkler Co., 143 St. Maurice street. 4-sty., 53 x 112, brick and concrete construction.

Stable to cost $5,000, 290 Papineau avenue, for Montreal Dairy Co., 290 Papineau avenue. Architect, Jos. Sawyer, 407 Guy street. General contractor, J. Monette, 290 Papineau avenue. 2-sty., 58 x 68.

Store and dwelling to cost $[illegible], [illegible] Dufferin street, for V. Trottier, 928 Huntley street. Contractor is owner. 2-sty., 50 x 50, brick veneer construction.

Factory to cost $8,000 for Canadian Boomer & Brachert Press Co. Ltd., 18 Tansley street, manufacturers hydraulic

(Continued on page 76.)

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

Drag Lines For Sale

The following Drag Line Excavators are for sale at a big sacrifice. All in good working condition.

2—Heyworth Newman 100 ft. booms, both late models; all steel construction throughout—used on one job only—practically as good as new. No better Drag Line made.

1—Lidgerwood Crawford 60 ft. boom—Page bucket—1½-yd. capacity.

1—Lidgerwood Class B—60 ft. boom, Page bucket—1½ yd. capacity—9 x 10 engine—60 h.p. boiler. Everything complete, including compressor, tank, etc.

Full particulars and locations on request.

MARSH COMPANY,
Old Colony Building
Chicago, Ill.

CITY OF SHERBROOKE

Granolithic Sidewalks

Sealed tenders, addressed to the Secretary-Treasurer of the City of Sherbrooke, Que., and endorsed "Tenders for Granolithic Sidewalks" will be received up to noon of **Friday, the 17th day of May, 1912**, for the following:

Approximately 5,000 square feet of Granolithic sidewalk with crossings and curbing in the different sections of the city.

A deposit of 10 per cent. of the estimated cost amount of contract must accompany each tender, and Bond will be required of the success- [illegible]

The lowest or any tender not necessarily [illegible]

Plans and specifications can be obtained from Thos. Tremblay, City Engineer, Sherbrooke, Que.

F. G. GRIFFITH,
Secretary-Treasurer.

Sherbrooke, Que., April, 1912. 19-20

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 382, Winnipeg. 11-23

Township of Wellesley

Tenders Wanted

Sealed tenders marked "Tenders for Drainage Work," addressed to A. B. Robertson, Reeve, Wellesley P. O., Ont., will be received up to 2 o'clock p.m., **Thursday, the 30th day of May, 1912**, for the construction of the J. H. Campbell Municipal Drain in the Eastern Section of the Township of Wellesley, in the County of Waterloo, Ont. The said tenders will be opened and considered at Crosshill, at 2 o'clock p.m., Thursday, May the 30th, 1912.

The lowest or any tender not necessarily accepted.

Tenderers must enclose cash $50 or marked cheque to that amount to insure good faith on the part of the contractors.

PETER F. SCHUMMER,
Township Clerk.

St. Clements, Ont., Apr. 30, 1912. 19-20

CITY OF SHERBROOKE

Sealed tenders, endorsed on envelope, "Tender for Paving," will be received by the undersigned up to three of the clock, afternoon of **Friday, the 17th day of May, 1912**, for paving the following streets:

Wellington street, from Dufferin Bridge to South side of King street, about 8,900 yards.

King street, from Wellington street to Aylmer Bridge, containing about 6,200 yards.

Bridge street, from Aylmer Bridge to East side of Bowen avenue, containing about 2,000 yd.

Depot street, from King street to Grand Trunk Station, containing about 1,100 yards.

Tenders will be received for Natural, Lake, Sheet, Asphalt or Bitulithic.

Further instructions as to specifications and forms of tender can be obtained from Thos. Tremblay, City Engineer, Sherbrooke, Que.

A marked cheque for 10 per cent. of the estimated amount of contract must accompany each tender.

The lowest or any tender not necessarily accepted.

F. J. GRIFFITH, Secretary-Treas.

Sherbrooke, Que., April, 1912. 19-20

City of Sault Ste Marie, Ontario

TENDERS

Sealed tenders fully endorsed and marked "Tender for Sewerage Works," addressed to W. H. Munro, Mayor, Sault Ste. Marie, Ontario, will be received by the City Clerk up to seven o'clock p.m. on **Monday, May 27th, 1912**, for supplying and laying about 21,000 lineal feet of tile sewer pipe with appurtenances.

Specifications and plans may be seen, and all information and forms of tender obtained, at the office of the City Engineer, Sault Ste. Marie, Ontario.

A marked cheque for 5 per cent. of the amount of the tender payable to the order of the City Treasurer, must accompany each tender. A bond to the amount of $5,000 or in lieu thereof a cash deposit of 10 per cent. of the amount of the tender will be required of the successful bidder.

The lowest or any tender not necessarily accepted.

C. J. PIM, City Clerk.
19-20 W. W. VAN EVERY, City Engineer.

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

Books for Sale

A number of books of interest to engineers and contractors are offered for sale at about one-half their cost. Among them are the following:

Reinforced Concrete, 590 pages, by Albert W. Buel, C.E. Publishers, The Engineering News Publishing Co., New York.

Chemistry and Physics of Building Materials, 350 pages, by Alan E. Munby. Publishers, Constable & Co., London, Eng.

Principles of Reinforced Concrete Construction, 320 pages, by F. E. Turneaure and E. R. Maurer. Publishers, Jno. Wiley & Sons, New York.

Treatise on Masonry Construction, 740 pages, by Ira Osborn Baker. Publishers, Jno. Wiley & Sons, New York.

Baldwin on Heating for Buildings, Revised 16th Edition, 400 pages, by Wm. J. Baldwin. Publishers, Jno. Wiley & Sons, New York.

Cement Laboratory Manual, 120 pages, by L. A. Waterbury. Publishers, Jno. Wiley & Sons, New York.

Light and Heavy Timber Framing Made Easy, 395 pages, by Fred T. Hodgson. Publishers, Frederick J. Drake & Co., Chicago.

Practical Concrete Block-making, 75 pages, by Chas. Pallister. Publishers, Industrial Publication Co., New York.

Short Cuts in Carpentry, 90 pages, by Albert Fair. Publishers, Industrial Publication Co., New York.

Estimating Frame and Brick Houses, Factories and Outbuildings, 250 pages, by Fred T. Hodgson. Publishers, David Williams Company, New York.

Sanitation and Sanitary Engineering, 175 pages, by Wm. Paul Gerhard.

Structural Details or Elements of Design in Heavy Framing, 370 pages, by Henry S. Jacoby. Publishers, Jno. Wiley & Sons, New York.

Architectural Composition, 234 pages, by Jno. Beverley Robinson. Publishers, D. Van Nostrand Co., New York.

Guide to Sanitary Inspection, 230 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New York.

Building Construction and Superintendence, 960 pages, by F. E. Kidder, revised by Thos. Nolan. Publisher, W. T. Comstock, New York.

The Water Supply, Sewerage and Plumbing of Modern City Buildings, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New Pork.

Modern Baths and Bath Houses, First Edition, 310 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New York.

Resistance of Materials, 650 pages, by N. de Tedasco and A. Maurel.

Modern Homes, 240 pages, by T. Raffles Davidson. Publishers, Geo. Bell & Sons, London, Eng.

The above books, together with a number of others, may be seen at the office of the Contract Record, 220 King street west, Toronto. Further particulars of any book furnished on request.

Department of Railways and Canals, Canada

Saulte Ste. Marie Canal

Notice to Contractors

Extension of Time

Notice is hereby given that the time for receiving tenders for widening the Lower Entrance Channel-way, Sault Ste. Marie Canal, advertised to be in on Friday the 10th May, 1912, is extended to 16 o'clock on Monday the 20th of May.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 29th April, 1912.

Newspapers inserting this advertisement without authority from the Department will not be [illegible] 22284 19-20

CITY OF SASKATOON

Garbage Incinerator

Sealed tenders, addressed to the City Commissioners, Saskatoon, and endorsed "Tender for Incinerator Plant," will be received up to twelve o'clock noon on **Tuesday, the 25th day of June, 1912**, for the complete installation (including all buildings) of a 70-ton per 24 hours Incinerator Plant, and the operation of same for a period of three months after completion.

Contractors will tender on their own plans and specifications, and tenders must be accompanied by a marked cheque for five per cent. of amount of tender, which will be returned on the expiration of the three months operating period.

Cheques of unsuccessful bidders will be returned within two weeks of awarding of contract.

The lowest or any tender not necessarily accepted.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., April 26th, 1912. 19-21

Tenders Wanted

Sealed tenders will be received by the under [illegible] up to 5 o'clock p.m. of **Monday, June 3rd, 1912**, for supplying the Corporation of the City of Ham- [illegible] direct connection to turbine pumps, with transformers, switching apparatus and accessories [illegible]

Also for two units of turbine pumps, each of a capacity of 6,500,000 Imperial gallons per 24 hours, for direct connection to synchronous motors.

The whole to be delivered and erected in the Beach Pumping Station of the Corporation of [illegible]

Specifications for the above can be seen at the office of the City Engineer, where form of tender and other information can be obtained.

Tenders must be on forms supplied and be by [illegible] Motors," or, as the case may be.

Tenders for the above will be received either separately or combined.

The lowest or any tender not necessarily ac- [illegible]

S. H. KENT, City Clerk
Hamilton, May 10th, 1912

NORTH BAY, ONT.

To Contractors

Bulk or separate tenders will be received for all trades, exclusive of heating and plumbing, for certain alterations and additions to the High School, North Bay. All tenders to be accompanied with a marked cheque for ten per cent. of the amount of the contract, made payable to the High School Board, and are to be in the hands of the Secretary, Miss H. A. Beattie, not later than Saturday, May 25th, 1912. Plans and specifications may be had from the office of the Architect, T. K. Burt, North Bay.

The lowest or any tender not necessarily accepted.

Dump Cars For Sale

We have a lot of contractors' dump cars, some slightly used, the balance in good working condition. The list includes the following:

10—2-yd. Olivers, 36-in. gauge.
35—3-yd. Specials, 36-in. gauge.
10—4-yd. Westerns, 36-in. gauge.
54—4-yd. Ryan & McDonald, 36-in. gauge.
18—12-yd. Westerns, M.C.B. trucks, standard gauge.
20—12-yd. standard gauge, centre dump cars.
8—22-yd. centre dump cars, standard gauge.
30—30-ton hopper bottom gondolas, standard gauge.

Write for complete list of Dump Cars, Dinkies, Steam Shovels and other Contractors' Equipment for sale.

MARSH COMPANY,
Old Colony Building
Chicago, Ill.

City of Sault Ste Marie, Ontario

TENDERS

Sealed tenders fully endorsed and marked "Tender for Cement Walks" addressed to W. H. Munro, Mayor, Sault Ste. Marie, Ont., will be received by the City Clerk up to seven o'clock p.m. on **Monday, May 27th, 1912**, for the construction of about 169,000 square feet of Cement concrete sidewalks and about 21,000 lineal feet of concrete curbing.

Specifications and plans may be seen and all information and forms of tender obtained, at the office of the City Engineer, Sault Ste. Marie, Ontario.

A marked cheque for $1,500, payable to the order of the City Treasurer must accompany each tender. A bond to the amount of $5,000 or in lieu thereof a cash deposit of 10 per cent. of the amount of the tender will be required of the successful bidder.

The lowest or any tender not necessarily accepted.

C. J. PIM, City Clerk.
19-20 W. W. VAN EVERY, City Engineer.

Bridge Tenders

Sealed tenders will be received up to noon on Tuesday, May 21, by [illegible] Mount Forest, for the following bridge work for the Counties of Grey and Wellington.

(a) Retaining walls for Mount Forest bridge
(b) Concrete Abutment for Scott's Bridge
(c) Moore's 35 ft. Concrete Girder Bridge.
(d) O'Dwyers 75 ft. Steel Bridge and concrete abutments

For plans and specifications and other information, apply to R. J. Shiel, Mount Forest, Ont., or to the Engineers.

H. GRAEF, Warden, Wellington County.
J. L. CARTER, Guelph, Ont.
J. W. SUTTON, Ospringe, Ont.
J. JOHNSTON, Warden, Grey County
MR. WEIR, [illegible]
BOWMAN & CONNOR, [illegible]
19-20 36 Toronto St., Toronto, Ont.

Notice

Tenders addressed to the undersigned, for constructing three bridges, cement abutments and floors and steel beams, one 30 ft., one 16 ft. and one 7 ft. span, also a retaining wall 128 ft. long, will be received by the council of the Township of Hay, up to two o'clock on **Wednesday, the 29th of May, 1912.**

Plans and specifications may be seen and particulars obtained at the Clerk's office at Zurich, Ont.

The lowest or any tender not necessarily accepted.

FRED HESS, Sr., Clerk,
Hay Township.
[illegible] May 9th, 1912 20-21

CITY OF TORONTO

Main Drainage Works

Sealed tenders for the supply of cast iron penstocks for the High Level Interceptor, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of **Tuesday, June 4th, 1912.**

They shall somprise one 78-inlh by 39-inch rectangular penstock, two 42-inch circular penstocks, and two 18-inch circular penstocks.

Plans, specifications, form of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control

20-21

Notice

To Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on **June 4th, 1912**, for the construction of the following work:—

Storm Overflow Sewer

Main Garrison Creek,

Sec. No. 2

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

Tenderers shall submit, with their tender, the names of two sureties, or in lieu of sureties, the [illegible] the City Treasurer.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with.

The lowest or any tender not necessarily ac- [illegible]

G. R. GEARY, Mayor,
Chairman, Board of Control.
City Hall, Toronto,
May [illegible] 1912

Contractors' Attention

We [illegible] Concrete Mixers, Hoisting Engines and other contractors' equipment.

[illegible] prices.

National Sand & Material Co., Ltd.,
[illegible] Welland, Ont.

To Contractors

Lump and separate tenders will be received until the 27th inst., for the several trades required in connection with additions and alterations to a building on Victoria street, near King street.

Plans and specifications can be seen and any other information obtained at the offices of the Architect, 164 Bay Street.

E. J. LENNOX, Architect.

Fergus Water Works

Tenders will be received until **May 29th, 1912,** [illegible] Fergus Water Works:—

Cast Iron Pipe, Excavation (including rock), and Pipe Laying, Hydrants and Valves, Pumping Machinery, Water Tower, Drilling Wells.

For further information apply to

BOWMAN & CONNORS, Civil Engineers,
20 Berlin, Ont.

CITY OF VERNON, B.C.

Tenders, in duplicate, for Electrical Equipment, will be received by D. G. Tate, City Clerk, up to Three O'Clock P.M., **June 10th, 1912,** for the delivery F.O.B. Vernon, B.C., of the [illegible]

1—125 K.W., Three Phase, Sixty Cycle Generator.
1—Exciter, direct connected to above.
1—Five panel Switchboard.
1—Series Tungsten or
1—Arc Lighting System.

Specifications will be on file at the following offices: Canadian Electrical News, Toronto; Contract Record, Toronto; Canadian Engineer, Montreal and Winnipeg, and Mather, Yuill & Company, Limited, Consulting Engineers, Vancouver, B.C. 20-23

City of Moose Jaw, Sask.

Tenders for Water Work Fittings

Sealed tenders, marked "Tender for Water Work Fittings," addressed to the City Commissioners, Moose Jaw, will be received up to twelve o'clock noon on **Thursday, May 30th, 1912,** for the supply of the following material F.O.B. [illegible]

300—⅝-in. Main Cocks (flange).
300—⅝-in. Curb Cocks (flange).
[illegible]
25—⅝-in. double unions.
400—¾-in. cases and spindles.
25—Extra caps for ¾-in. case.
100—¾-in. Flange curb cocks.
150—¾-in. Flange main cocks.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, Sask., May 8th, 1912. 20-21

TENDERS

Dominion Linen Mfg. Co. Ltd.

Tenders will be received from all trades up to **Saturday, May 18th inst.,** for the erection of a factory for the Dominion Linen Manufacturing Company, Limited, at Guelph.

Particulars at the offices of

COLWILL TANNER & CO., Architects,
Traders Bank Building,
20 Guelph, Ont.

TENDERS

Tenders wanted for the erection of a four-room brick public school building for the village of Port Colborne, Ont., in bulk or separate from the different trades. Plan may be had of the secretary of Public School Board of Port Colborne, or at the office of the architect, C. M. Borter, 102 Main street, Niagara Falls South, Ont. Tenders to close May 25th, 6 p.m. A marked cheque for 5 per cent. of the amount of the tender made payable to the secretary of the School Board to accompany the same.

The Board reserves the right to reject any or all tenders.

20-21

Tenders for Bridges and Excavation for Canal

Tenders will be received up to **June 6th, 1912,** for the erection of two steel bridges over the Sauble River between the Townships of Sullivan and Arran. One bridge to be 40 ft., the other 60 ft. span, 16 ft. roadway and concrete floor; also for four concrete abutments for same, on pile foundations.

And also for digging a canal to deviate the Sauble River between parts of said townships.

Plans and specifications can be seen with Joseph Grant, Reeve of Tara, and August Klegis, Reeve of Sullivan, Marmion P.O. A certified bank cheque for 5 per cent. of amount, payable to the Treasurer of the County of Bruce to accompany each separate tender.

Duplicate tenders are required, one to be addressed to John Rutherford, Co. Clerk, Grey, Owen Sound, the other to P. A. Malcolmson, Co. Clerk, Bruce, Southampton.

Tenders to state what difference in price, if any, if only half the canal is dug this season.

The lowest or any tender not necessarily accepted.

JAMES WARREN,
Engineer-in-Charge.
Walkerton, May 11th, 1912. 20-21

NAVAL SERVICE OF CANADA

Sale by Tender of Steamer "KESTREL"

Sealed tenders addressed to the undersigned and accompanied by a certified cheque for $500, will be received up to noon on **Wednesday, the Third day of July, 1912,** for the purchase of the Canadian Government Steamer "Kestrel," lately employed in Fishery Protection dnties on the British Columbia Coast and now lying at H.M.C. Dockyard Esquimalt, B.C.

Forms of tender, conditions of sale, full particulars of the Steamer and permission to inspect her may be obtained on application from the Officer in charge, H.M.C. Dockyard, Esquimalt, B.C.

Unauthorized publication of this advertisement will not be paid for.

G. J. DESBARATS,
Deputy Minister,
Department of the Naval Service,
—22725 Ottawa, May 3rd, 1912. 20-22

Business Buildings and Industrial Plants

(Continued from page 73)

presses. Architect, Hutchison, Wood & Miller, 50 Royal Insurance Bldg. General contractor, F. M. Hartman, 17 Guy Block, St. Catherine street. 1-sty., 115 x 35, concrete and steel construction.

Toronto, Ont.

3 stores and billiard room to cost $12,000 on McGee and Queen street, for C. Shier. Tenders received by Architect, Mallory & Thatcher, 31 Queen st. W. Mason, Jno. Cardwell, 120 Major street. Carpenter, A. E. Dunn, rear of 203 Yonge street. Brick.

Store to cost $3,000, Emerson & Royce, for Volk & Gee, 455 Ossington avenue. Architect, J. Gladwin Hedges, 34 Yonge street. Owner is builder. 2-sty., 25 x 40.

Alteration to store to cost $5,000 at Yonge and Trinity street, for A. Levy, Architect, A. J. Rattray, Stair Bldg. Mason, R. H. Harman, 156 Dupont St. Carpenter, R. G. Kirby, 539 Yonge St. Other contracts open.

Sarnia, Ont.

Store, Christina street, cost $5,000, for Jos. Peterson. Architect, R. W. Fawcett. General contractor, A. E. McDonald. Roofing contractor, Brantford Rfg. Co., Brantford. Two storeys, brick construction.

Saskatoon, Sask.

Addition to brewery, cost $20,000, for Hoeschen Wentzer Brewing Co. Architect, Otto Tuhr, Chicago, Ill. General contractor, O. Teary, Saskatoon. Reinforced concrete construction.

Garage, cost $14,000, for McLaughlin Co., Church street, Toronto, Ont. General contractor, Freid Lewis Co., Winnipeg, Man. Two storeys, brick construction.

Vancouver, B.C.

Alterations to building to cost $42,000, Granville and Dunsmuir, for Dr. S. J. Tunstall, 709 Dunsmuir street. Contractor, Wm. Odell, 757 Beatty street, will receive tenders for cut stone, glass, marble, tile, cement, brick, hardwood, plumbing and heating.

Power Plants, Electricity and Telephones

Fort William, Ont.

Power house to cost $15,000, Mission street, for Ft. William Coal Dk. Co. Architect, R. E. Mason, Ft. William. Solid brick construction. Plans under way.

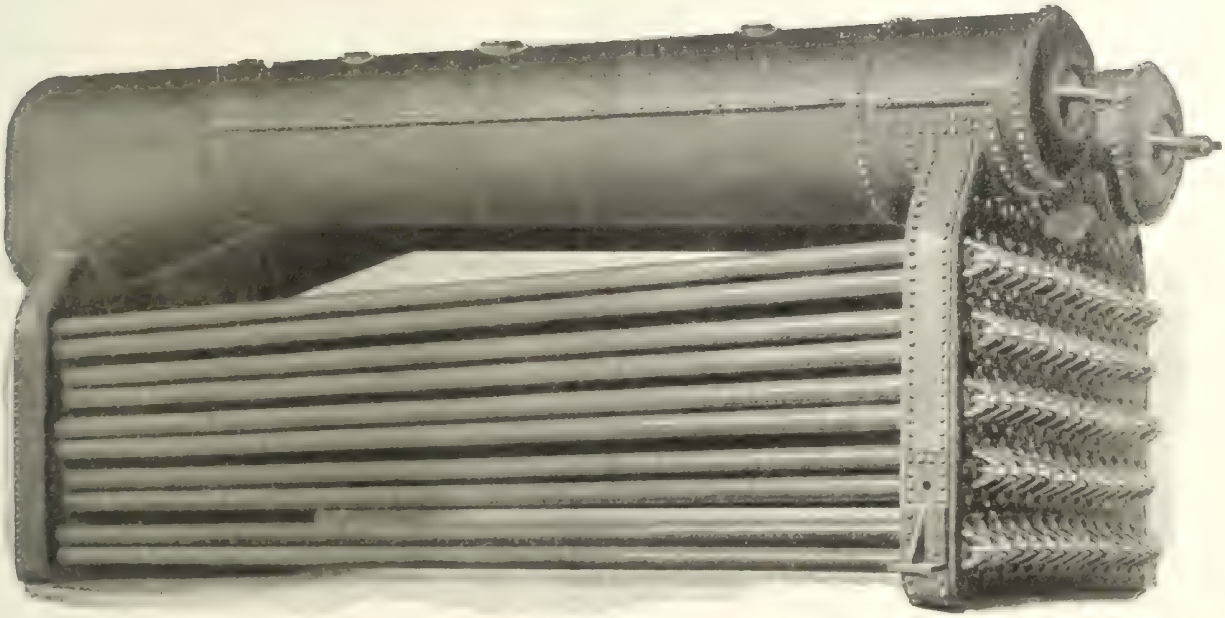
Hamilton, Ont.

Transformer station, Hughson street, cost $30,000. Mayor, Geo. H. Lees. City Clerk, S. H. Kent. City Engineer, E. L. Sifton. Architects, Watt & Blackwell, Lister Bldg., Hamilton. Tenders received until May 29th, electric elevator, steel sash, ornamental iron and metal work, plumbing, reinforced concrete.

Port Arthur, Ont.

Offices and telephone exchange, cost $15,000. Architects, Hood & Scott, Port Arthur. General contractor, J. L. McRae, Port Arthur. Three storeys, 32 x 50.

If You Want Service Buy an Inglis Boiler



Here is a boiler that is backed with 52 years of successful practice,—a boiler that can be depended upon to give you the same service we put into it.

We know you want proved and guaranteed service not only when you buy, but in the years that are to come.

Our service extends beyond the transaction with you—its the perpetual service that's found in every Inglis boiler.

The detail of designs, the careful manufacture and skill in assembling of each and every part are minute and exact in every particular.

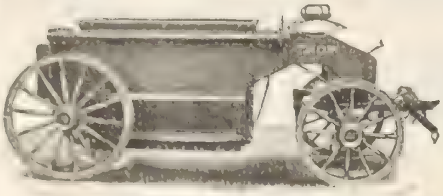
The work we have done for others in designing and building power plants has proven eminently satisfactory.

Get in touch with us and find out what we can do for you.

THE JOHN INGLIS COMPANY LIMITED

Engineers and Boiler Makers **Strachan Ave., TORONTO**

On That Draft Proposition



Long or short coupled? When you say a long coupled wagon pulls as easy as one coupled a foot shorter, you get a laugh from every man who ever drove a team. This close-axled TROY *does* pull easier than any other wagon. It *doesn't* stall on the dump. It's loads *are* full measure.

Isn't it the wagon for you? Get Catalog 2Z and the price.

The
Troy Wagon Works Co.
N. Market St., Troy, Ohio

Canadian Distributors:
Baines & Peckover, Toronto; N. J. Dinnen & Co., Winnipeg; Vancouver Carriage Co., Vancouver; Canadian Equipment & Supply Co., Ltd., Calgary; J. H. Anderson & Co., Montreal.

red Holmes, President C. P. Holmes, Sec'y-Treas

Telephone North 663

Fred Holmes & Sons
Limited
Building Contractors

1113 Yonge St., Toronto

The
Phœnix Bridge & Iron Works
MONTREAL Limited

General Steel Contractors
Large stock I Beams, Channels, Angles, Tees, Zees, and Plates always on hand.

Canada Lumberman
& Wood Worker
Toronto, Canada

D 100

Stock Doors

WHOLESALE RETAIL

THESE are some of our Stock Designs. We carry a stock of from six to ten thousand and can ship any quantity of stock sizes, grades and styles immediately.

We call your attention specially to Door No. D 100 in No. 2 grade. It is practically clear. In many cases they run clear. Our grades all through are much above the standard.

We solicit a trial order for we are sure if you once use our doors it will mean a continuance of you handling them,

If there is any other style of Door you require, let us have your list and we will be pleased to quote you. We are in a position to get them out in short notice.

Write for Catalogue Prompt Shipments

L. A. DeLaplante, Limited
208 Main Street, TORONTO
Phone: Beach 230—221. Exchange to all Departments

D 120

Centrifugal Pumps

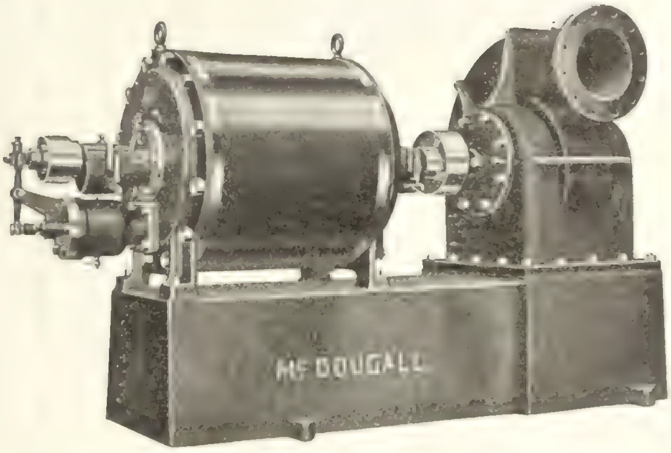
DRIVEN BY

KERR STEAM TURBINES

FOR

WATER HEATING SYSTEMS

SEE BULLETIN 106



75 h.p. Turbine and 10″ Pump—Capacity 2150 gals. per min.

THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO. Limited

WORKS: WILLIAM and SEIGNEURS STREETS, MONTREAL

Sales Offices: **MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER**

WATER PURIFICATION

¶ This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
305 KENT BUILDING, TORONTO

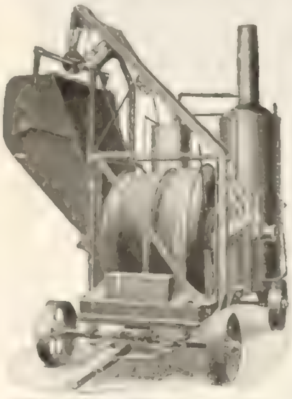
Deeds, Not Words !

Mr Contractor Don t take our word for it, that we have the best **Concrete Mixer** on the market, but ask any contractor who has used, or is using the

Chain Belt Mixer

just what he thinks of it.

IN MILWAUKEE there were about twenty-three concrete mixers sold in 1911, and fourteen were **Chain Belts.** Six of the leading concrete mixer concerns have their plants in Milwaukee. Draw your own conclusions, Mr. Contractor.



"The Mixer With the Bulge"

Where there is big construction work you will generally find a **Chain Belt Mixer** on the job. You owe it to yourself to investigate the **Chain Belt** before placing your order.

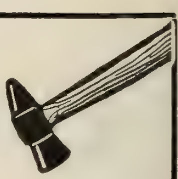
We also make elevators and gravity distributing systems. Send to-day for Catalog No. 42.

Chain Belt Co.

Milwaukee, Wis.

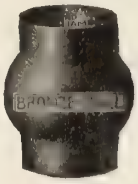
Canadian Agents: Winnipeg—Dominion Equipment & Supply Co.; Vancouver—Dominion Equipment & Supply Co.; Montreal—Canada Machinery Agency; Ottawa—The General Supply Co. of Canada.

Can You Put This ☞



IN HERE ☞

in your crusher



and

have

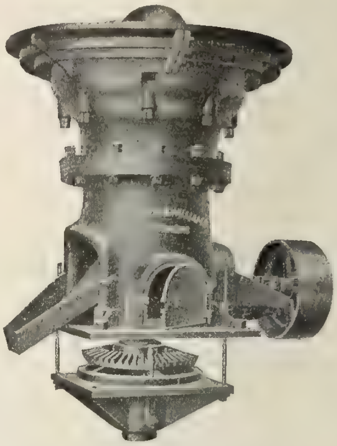
it

COME OUT

HERE ☞

without injuring

your crusher



If not write us about our Bronze Ball Gyratory Crusher and let us tell you what the experience of one operator was in letting a large sledge hammer go through his crusher.

Ask for Catalogue L 14.

Chalmers & Williams

General Office & Works
Chicago Heights, Ill.

New York Office
Singer Building

When you are preparing your specifications and tender forms for your streets, boulevards or country roads be sure to make them wide enough to include

FINISHED DOLARWAY PAVEMENT

$Dolarway Pavement

For Park Roads, Boulevards, City Streets, Highways, Etc.

What is Dolarway Pavement?

Five to six inches of Portland Cement Concrete provided with the necessary expansion joints. The surface is then treated with our adhesive Dolarway Bitumen and with coarse sand or fine gravel or screenings. This seals the concrete, prevents cracking or chipping, and produces a wearing surface which is clean, noiseless, resilient and similar in appearance to other forms of bituminous pavement. It does not bleed in hot weather, neither does it become brittle or peel in the cold. It is a well-known fact that moisture causes concrete to expand and contract 5 times as much as a change in temperature. Our seal coat keeps out this moisture, thereby preventing the cracking and chipping which would otherwise occur.

J. H. McKnight Construction Co., Limited

Contractors and Engineers—Specializing on Municipal Improvements

152 Bay Street, Toronto

REVERSIBLE
10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line 2,600 Lbs.

On a Double Line will Lift 5,200 Lbs.

160 Feet per Minute
80 Feet per Minute

Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

Weight with Boiler, 4,000 lbs; without Boiler, 2,400 lbs. Light enough to be moved about easily.

Length over all, 5 ft. Width over all, 5 ft. 10 in. This Engine is also made non-reversing, at a reduced price and weight. Made with One Drum or Two Drums.

Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

Hayes Patent Metallic Lath

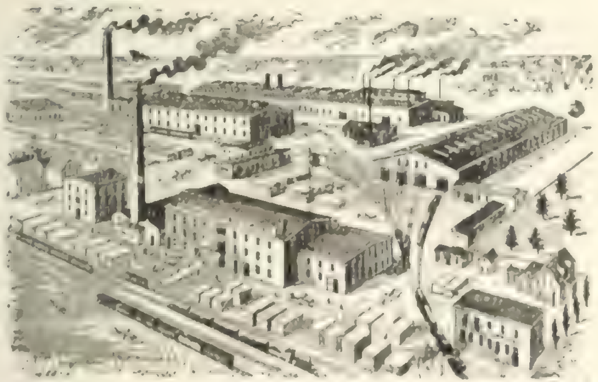
The positive key of the "Hayes" lath is unequalled in any other form of lathing. Examination of sample will prove this to you.

Specially suitable for tile work

SAMPLE BY MAIL ON REQUEST

The Metallic Roofing Co. LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.

Rhodes, Curry Co., Limited
Lessees



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SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

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The Most Satisfactory Brick
on the Market

RESIDENCE ON RUSSELL HILL DRIVE BUILT WITH HAMILTON PRESSED BRICK.

For Public Building, Apartment House or Private Residence; whether for a large institution calling for elaborate architectural effects, or for a small building of plain simple design

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will ensure absolute satisfaction.

Our clay deposits afford the best material for brick-making—clay rich in iron oxide. From this high grade raw-material with our expert workmanship and modern plant is produced the Brick that has achieved such popularity with Architects and Contractors throughout the Dominion.

We are ready to fill large and small demands at short notice and will guarantee prompt shipments.

Always Specify HAMILTON PRESSED BRICK

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Lap Welded Steel Pipe

MADE IN SIZES

12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.
Ask our Welded Pipe Dept. for prices.

American Spiral Pipe Works

MANUFACTURERS OF

SPIRAL RIVETED PIPE LAP WELDED PIPE
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Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers

East Iron & Machine Company, Lima, O., U. S. A.

Crushed Stone

All sizes. For Roadways and Sidewalks also specially adapted for

Reinforced Concrete Construction

Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

Phone Main 5377 or Write

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Head Office: **34 Yonge Street, TORONTO**

EVERYTHING YOU WANT

in a Factory Site

Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

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The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.
We have built many of these in Canada the United States and Mexico.
Estimates cheerfully furnished.

Send for Catalog No. 15

Des Moines Bridge & Iron Co.

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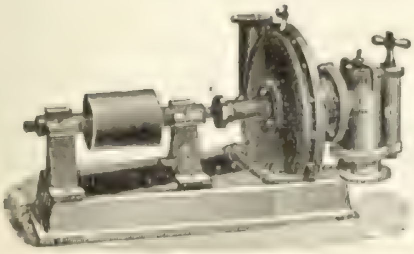
F. H. Hopkins & Company, Canadian Representatives, **Montreal, Quebec**

M. Beatty & Sons, Limited

Welland, Ontario, Canada

Dredges, Ditchers, Derricks,

Steel Dump and Deck Scows



Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
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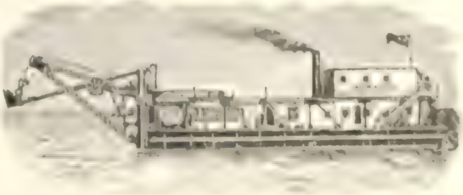
and other Contractors' Machinery.



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Contracts executed for every description of Porous Terra-Cotta Fireproofing and Hollow Tile Work

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Boiler Coverings

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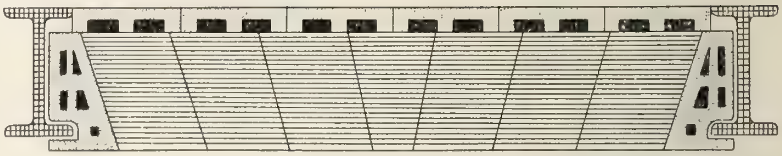
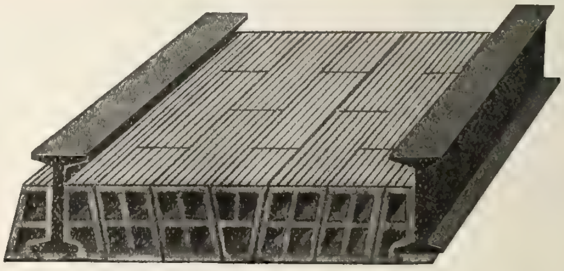
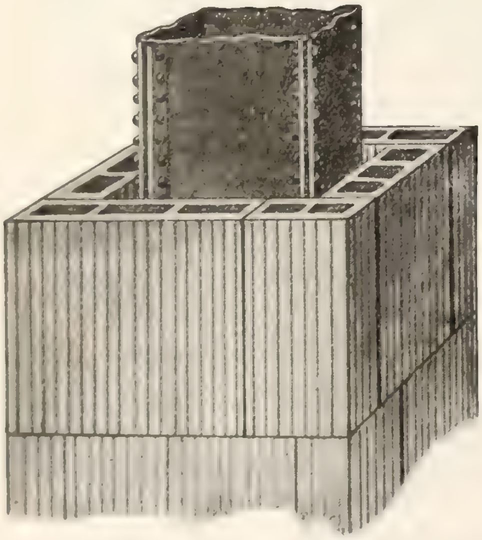


Type of Floor Arching—End Construction



Type of Floor Arching—Side Construction



Perspective of Column Covering

Estimates given to Architects, Engineers and General Contractors, for Porous Terra-Cotta fireproofing in any part of Canada.

We specialize in this branch of the building trade.

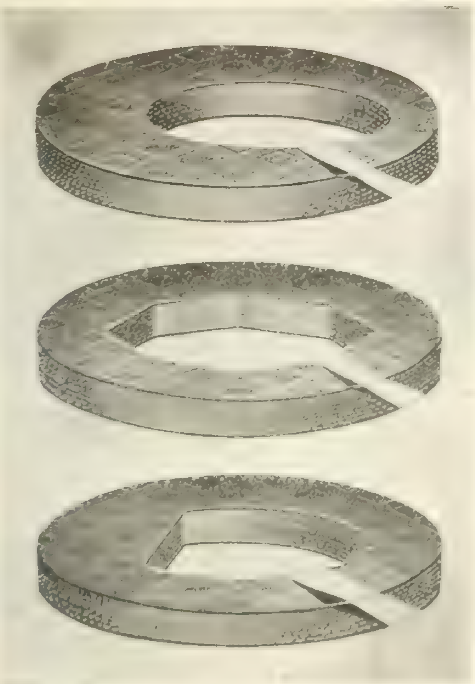
A list of buildings fireproofed by us forwarded on receipt of postal.

ROBERT BENNETT

Contractor

Builders' Exchange, TORONTO **Phone Main 710**

Residence Phone Beach 4



Garlock Steam Hammer Rings

Contractors' Supplies

We make a specialty of Steam Hose, Air Hose, Water Hose, Suction Hose, and Dredging Sleeves.

TRADE THE GARLOCK PACKING CO. TRADE GARLOCK MARK HAMILTON, CANADA. MARK

Steam Hammer Rings, Air Compressor and Hydraulic Packings of all descriptions.

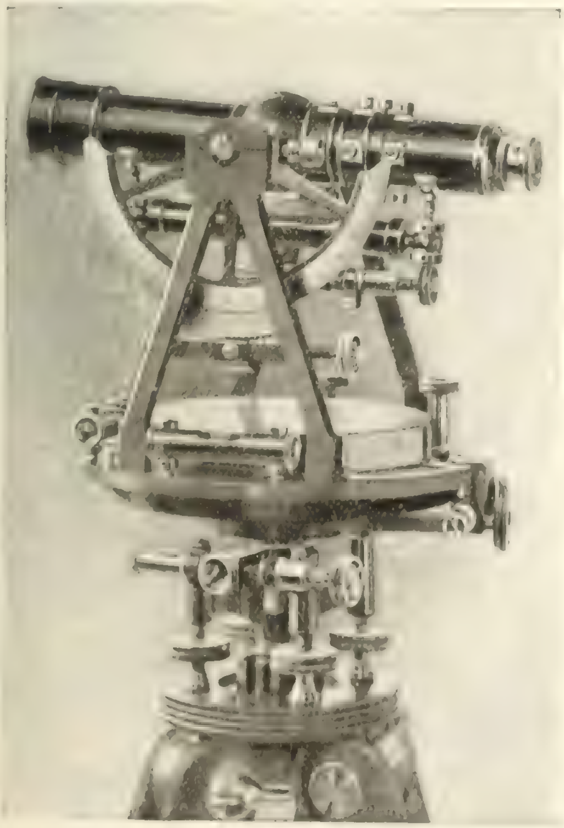
All Garlock Products are made up to a standard—not down to a price.

Write to-day for Garlock Catalog—Handsomely Illustrated—112 Pages.

The Garlock Packing Company

MONTREAL **TORONTO** **HAMILTON, ONTARIO** **WINNIPEG**

PIONEERS IN THE PACKING BUSINESS



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W. & L. E. Gurley

TROY, N. Y.

Largest Manufacturers in America of

Field Instruments

for Civil, Mining and Hydraulic Engineers and Land Surveyors

Transits	Current Meters
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Compasses	Chains
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Physical and Scientific Laboratory Apparatus
Standard Weights and Measures
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Branch Factory: 315 Maritime Building, Seattle, Wash.

Latest edition of Gurley's Manual sent on Application.

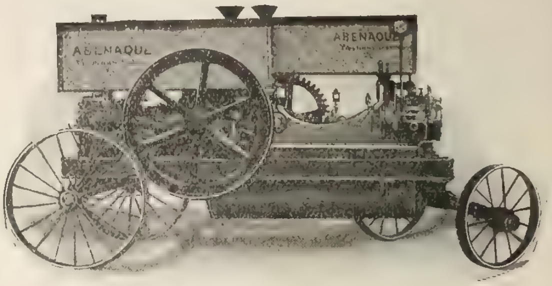
Take Advantage of Compressed Air Economy

BY USING AN

ABENAQUE

Portable Gasoline Engine Driven

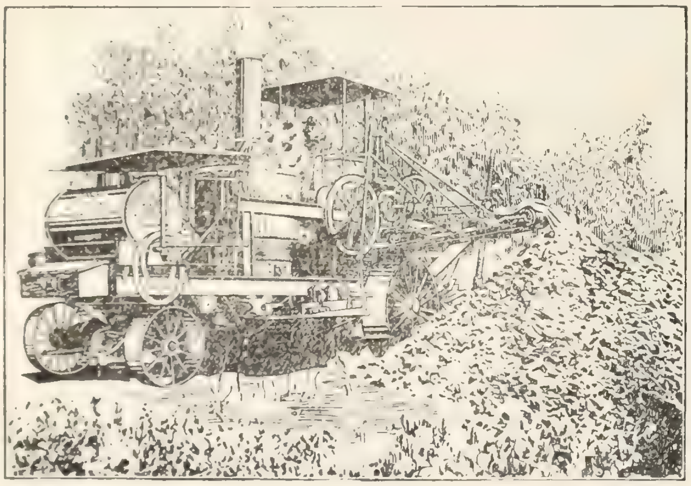
AIR COMPRESSOR OUTFIT



If you have any rock excavation for foundations, trench work, or any riveting, calking, etc., to do you will find an Abenaque Outfit can be used with [illegible] economy, and to better advantage than either hand or steam driven tools. Write for catalog "M."

ABENAQUE MACHINE WORKS, Westminister Station, Vt.

TRENCHING MACHINES



This year, labor is going to be scarce and very expensive. The amount of municipal work is going to be large and unless the Contractor uses the proper machine he will be behind time. If he gets one of our "Trenching Machines," which can make a cut all the way from 27 in. to 60 in. wide and any depth down to 20 ft., he will be sure to fulfil his engagements and save a big percentage of money.

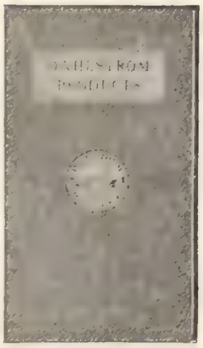
For further information, apply to

J. W. HARRIS MANUFACTURING CO.
LIMITED
MONTREAL

The Dahlstrom Products

A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.



Dahlstrom Metallic Door Co.

The Dahlstrom Products

Executive Offices and Factories: 17 Blackstone Ave., JAMESTOWN, NEW YORK.
Branch Offices in All Principal Cities.

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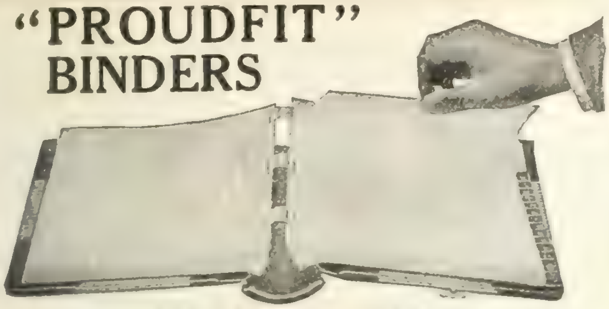

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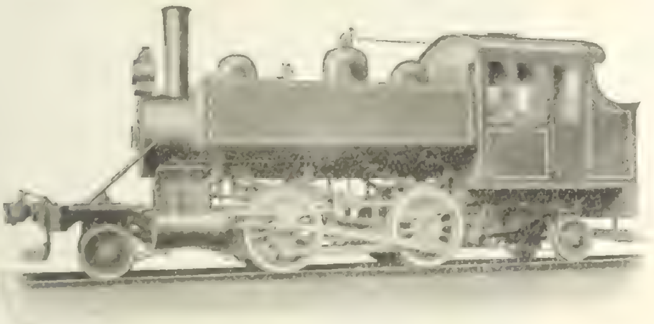

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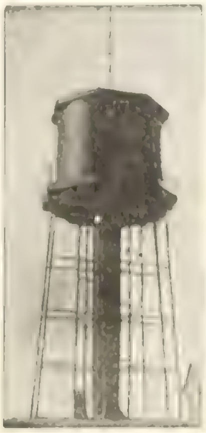

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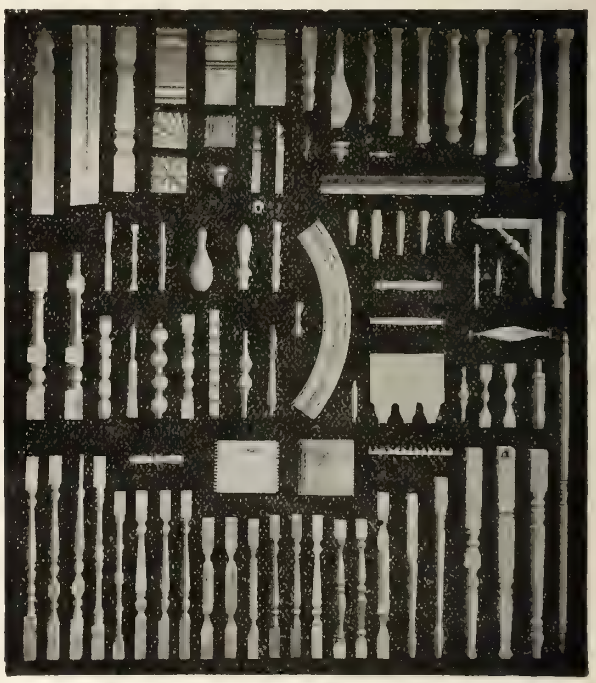

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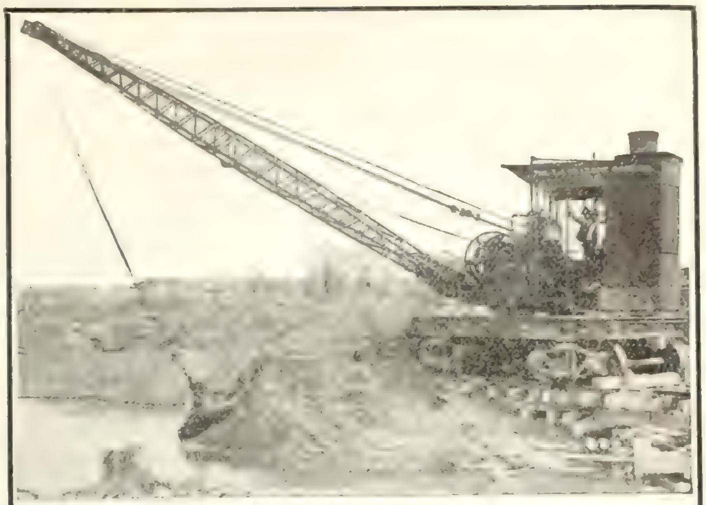

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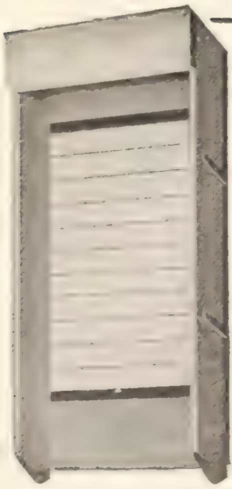

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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered [illegible]

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 and 30 per cent. for approved specifications:—

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.05	$4.40
40	3.25	4.75
50	3.65	5.55
60	3.90	6.00
70	4.15	6.50
80	4.65	7.00
85	5.10	7.85
90		9.10
95		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 [illegible]	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 and 5 per cent.
High grade compression work, [illegible] per cent.
Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 basin cocks, 70 per cent.
Flatway stop and stop and waste cocks, 65 per cent.; [illegible] 60 and 5 per cent.
[illegible] $1.85
[illegible] $2.25
Square head brass cocks, 60 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks

[illegible]

Lead Pipe

Lead pipe, [illegible] 20 per cent. off; caulking lead, 5½ cents per lb.; [illegible]

Iron Pipe

Size (per 100 ft.)	Black.				Galvanized
¼ inch	....	$1.87	¼ inch	....	$2.70
⅜ "	....	1.87	⅜ "	2.70	2.57
½ "	2.47	2.35	½ "	3.40	3.23
¾ "	2.88	2.75	¾ "	4.03	3.83
1 "	4.13	3.93	1 "	5.78	5.48
1¼ "	5.63	5.35	1¼ "	7.88	7.49
1½ "	6.75	6.44	1½ "	9.45	8.98
2 "	8.46	8.05	2 "	12.06	11.46
2½ "	13.51	12.85	2½ "	19.26	18.30
3 "	17.74	16.86	3 "	25.29	24.03

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.
7 and 8-inch pipe, 50 per cent.
Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.
Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.
Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.45.
Binder stone, $1.30 per ton, f.o.b. Toronto.
Burnt River rubble stone delivered, $15 to $16 per toise.
Free stone delivered, $15 to $16 per toise.
Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.
Brown sills and leads, in the rough, delivered, 40 cents per foot.
Rubble Stone in car lots, $1.30 per ton.
Scotch fire brick, delivered, $30 to $35 per M.
Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.
Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.
Lime, per cwt., delivered, not less than 1,500 lbs., 38 cents.
Plaster of Paris, per barrel, delivered, $3.10.
Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $7.25 per 100 lbs.
Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.
Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.
Boiled Linseed Oil, in barrels, $1.01 per gallon of 9 lbs.
Raw Linseed Oil, in barrels, 98c. per gallon of 9 lbs.
Turpentine, in barrels, 70c. per gallon.
Pure Red Lead, dry, $6 to $7 per 100 lbs

Business Notes

Chatham, Ont.

Interior of theatre owned by Frank Smith, was completely destroyed by fire. Complete new equipment, seats, furnishings, etc., will be required. Loss $6,000.

Gobles, Ont.

G. T. R. station here was destroyed by fire. Plans will be prepared at once for a new brick station with complete interior equipment. For further information write W. A. Davidson, Assistant Superintendent, London, Ont.

Montreal, Que.

The Mount LaSalle Institute on LaSalle avenue, was partially destroyed by fire; estimated loss, $7,000. They will rebuild.

Brewery on Chaboillez Square, owned by National Breweries Limited, damaged by fire to the extent of $10,000. President, A. J. Dawes.

Smeaton Bros. had their engraving and photography plant on Cote street entirely destroyed by fire. Loss estimated at $10,000. The building will be rebuilt.

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Send for our Catalogue of Asphalt Rollers and Mixers
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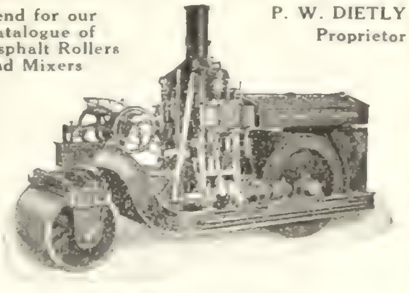

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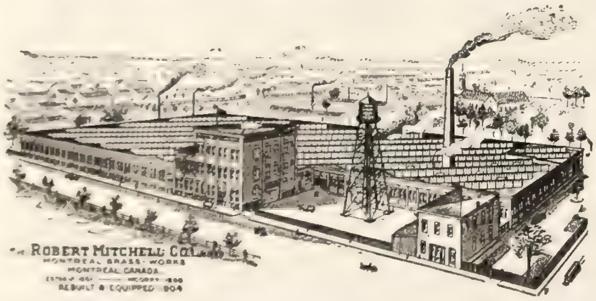
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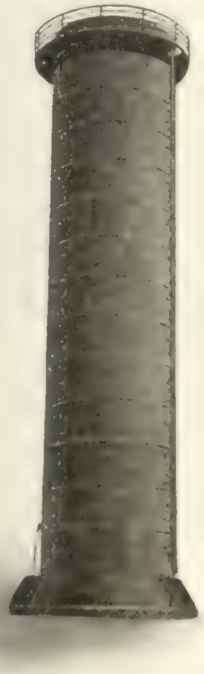

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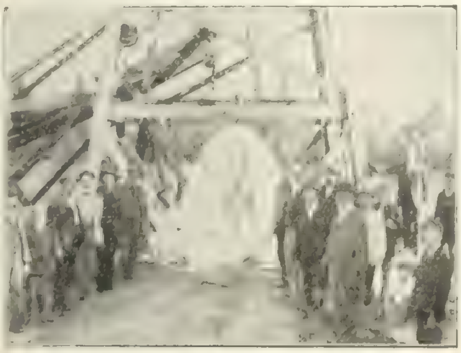

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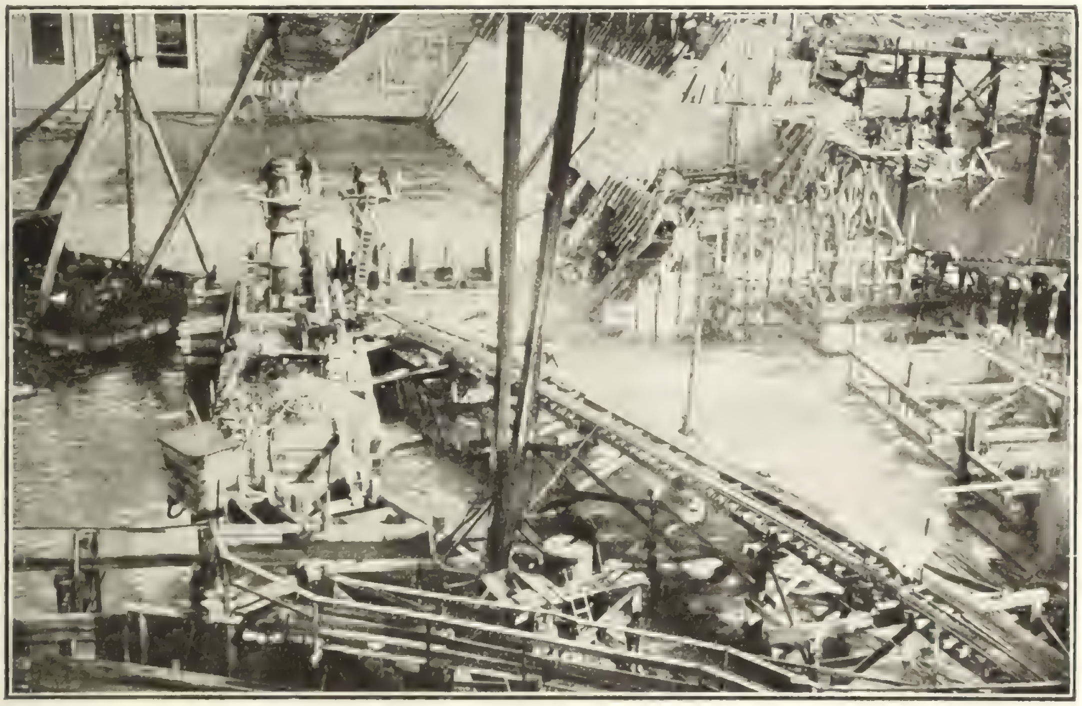

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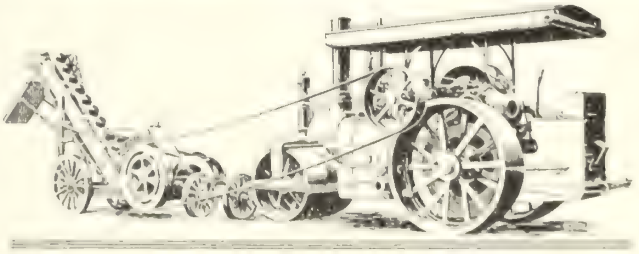

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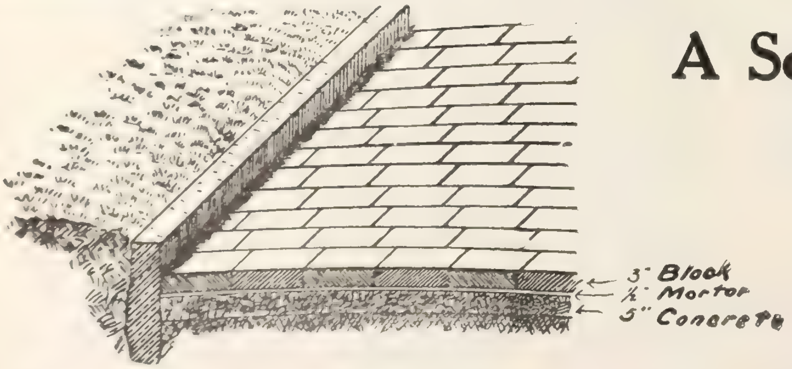

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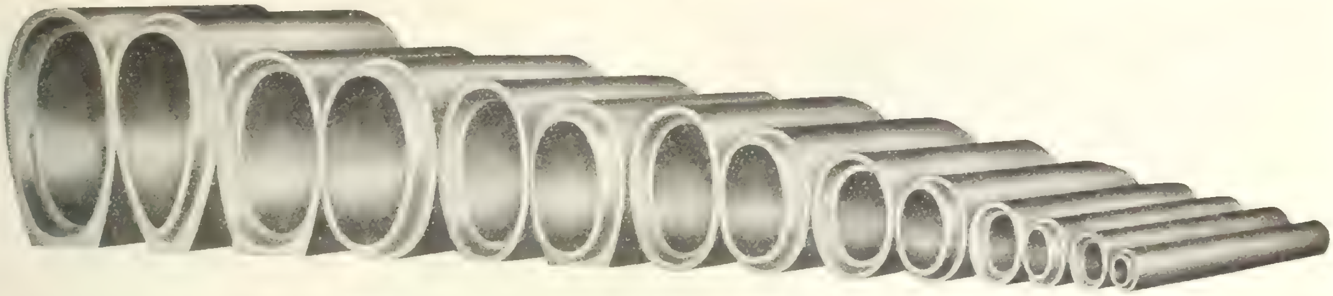

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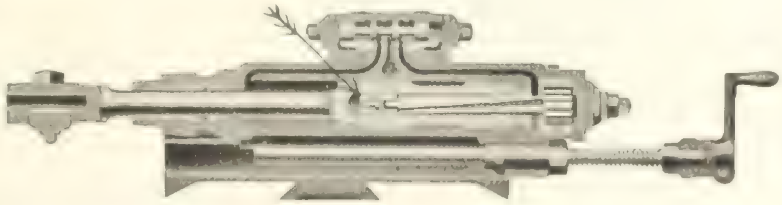

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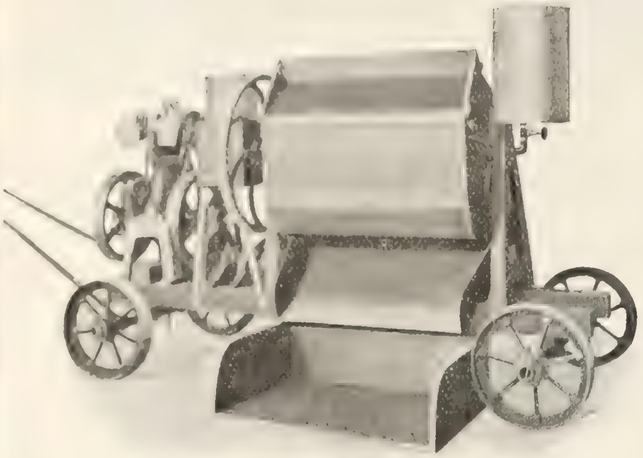

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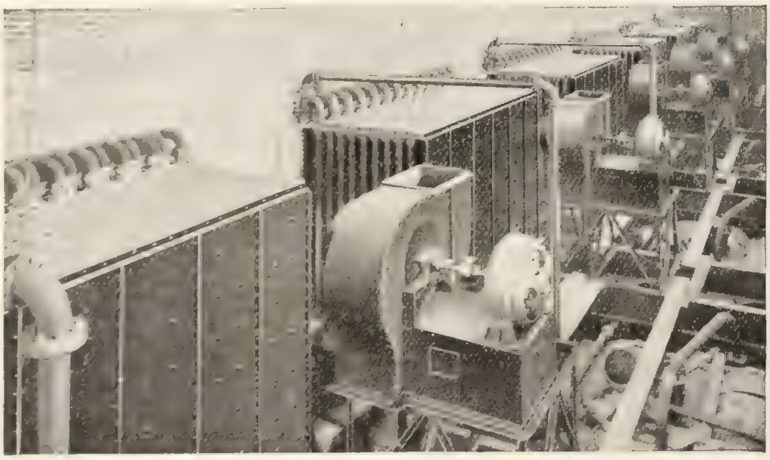

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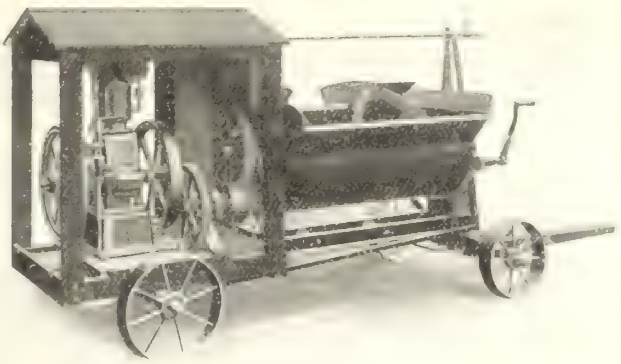

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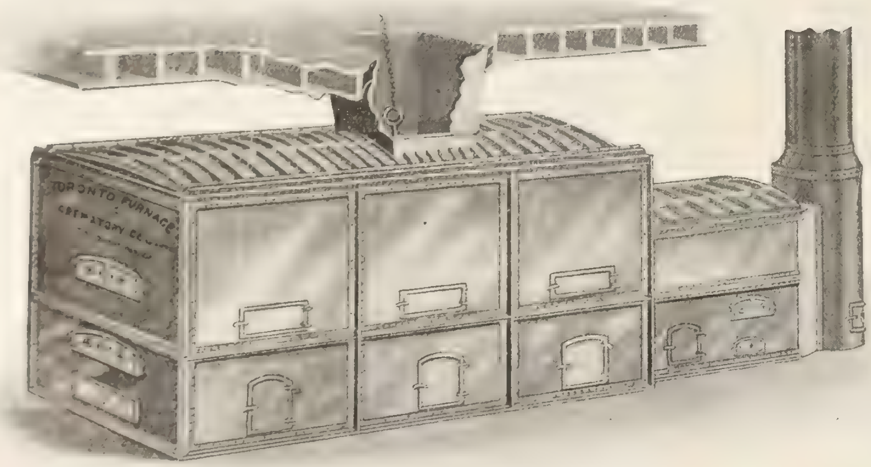

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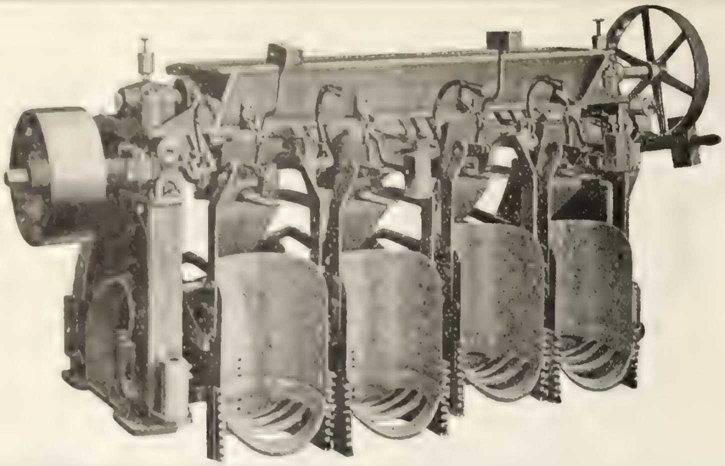

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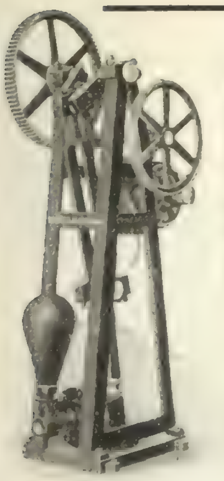
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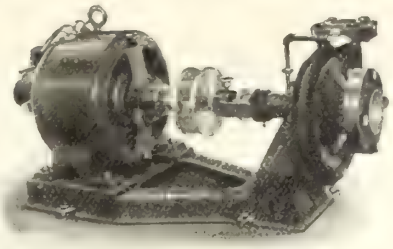
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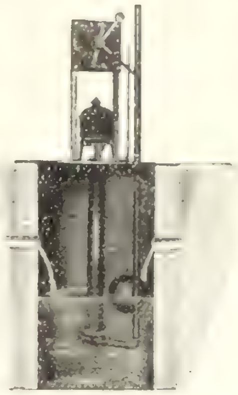

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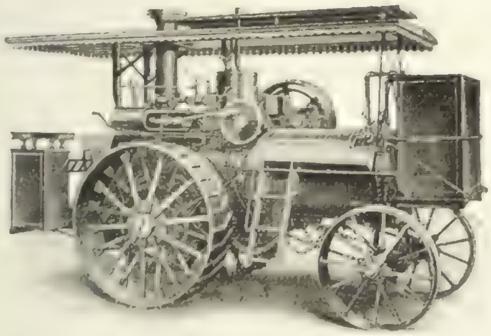

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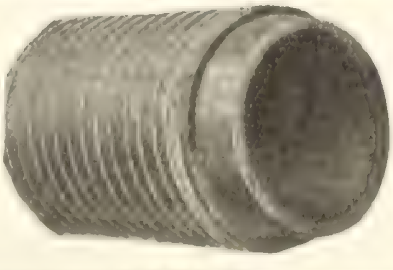

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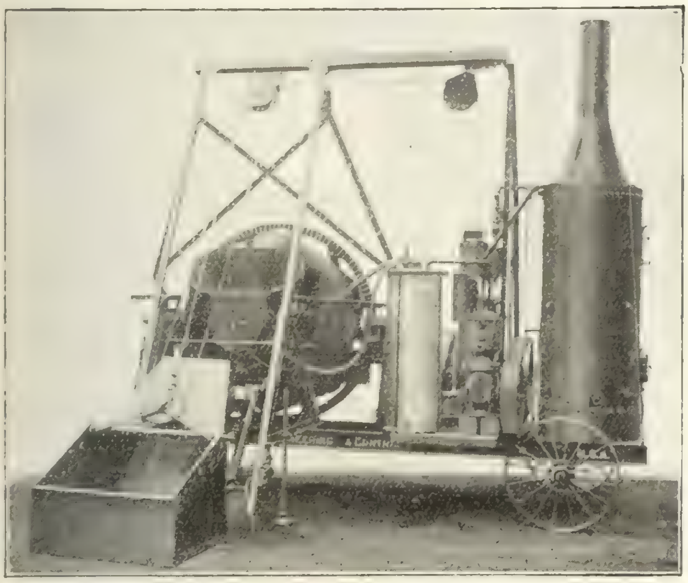

The cube principle of mixing produces the most perfect concrete that can be mixed.

differs from all other types in that the **mixing box is cubical** in shape instead of drum-shaped, and there are **no inside blades, scoops, deflectors or shelves**. The cube mixing box rotates on journals hung from diagonally opposite corners, and when charged with concrete ingredients it holds them in a unit batch; the rotating of the cube causes the batch to be folded over upon itself with a many-times multiplied mixing motion under pressure, and the result is that a **perfect mixing** which is the **cardinal feature of the Improved Cube Mixer.**

A Batch of Asphalt Concrete in Three Minutes

can be secured in an Improved Cube Mixer with an Austin Hot Mixing attachment.

Use the mixer as ordinarily to mix cement concrete for the base, then start the heat and mix asphalt concrete for the top. **One machine does double service.**

The blast swings with the mixer drum and is continuous; it does not obstruct or delay charging, discharging or any other mixer movement; it is operated by the regular mixer runner; it does not encumber the mixer in any way or reduce its speed for mixing cold or hot.

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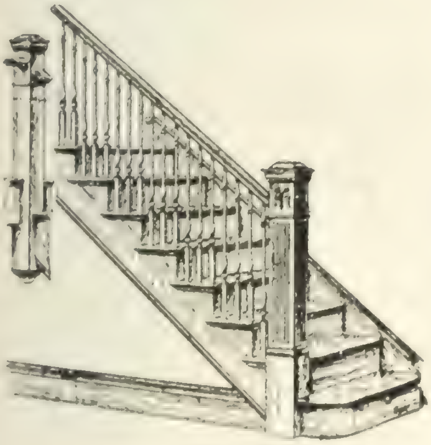

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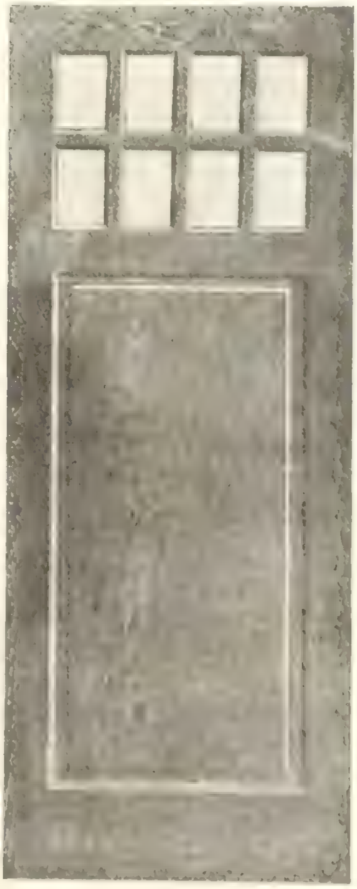

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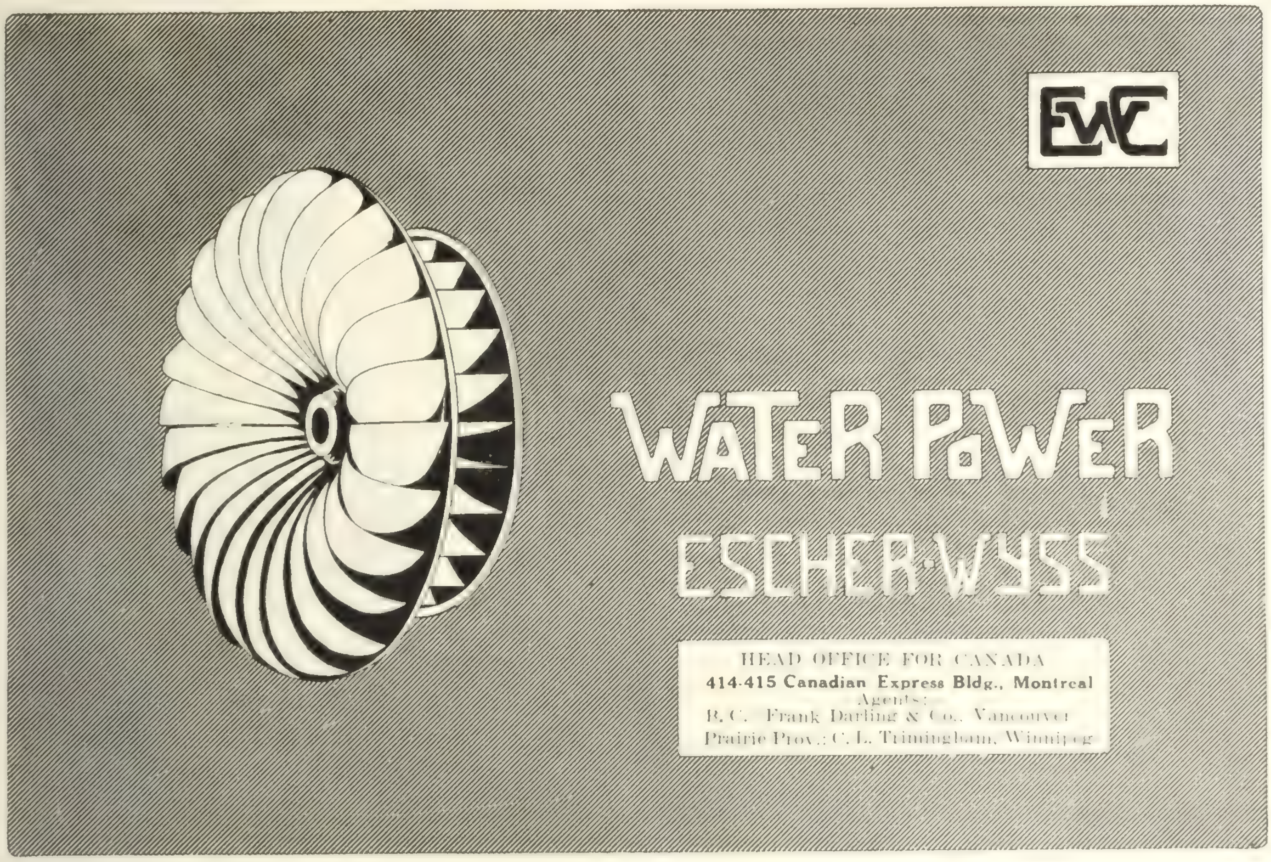

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Ceresit is a cream white paste which is dissolved readily in the water used in mixing concrete or cement mortar. By this method the Ceresit is uniformly distributed through the aggregates, thus filling the voids and giving greater density and strength to the concrete and mortar, and rendering it absolutely impervious to water or dampness even when subjected to great hydrostatic pressure.

"Ceresit" Waterproofing

Fountain in the Country Life Gardens, Garden City, Long Island, N.Y.

Ceresit acts as a protector to concrete and cement—by keeping the materials dry it prevents disintegration by frost.

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Ceresit does not darken the concrete or cement, but it does give it strength. We guarantee Ceresit to be an efficient waterproofing for any job we undertake and direct, and to prove our faith we will put up a cash bond if needed.

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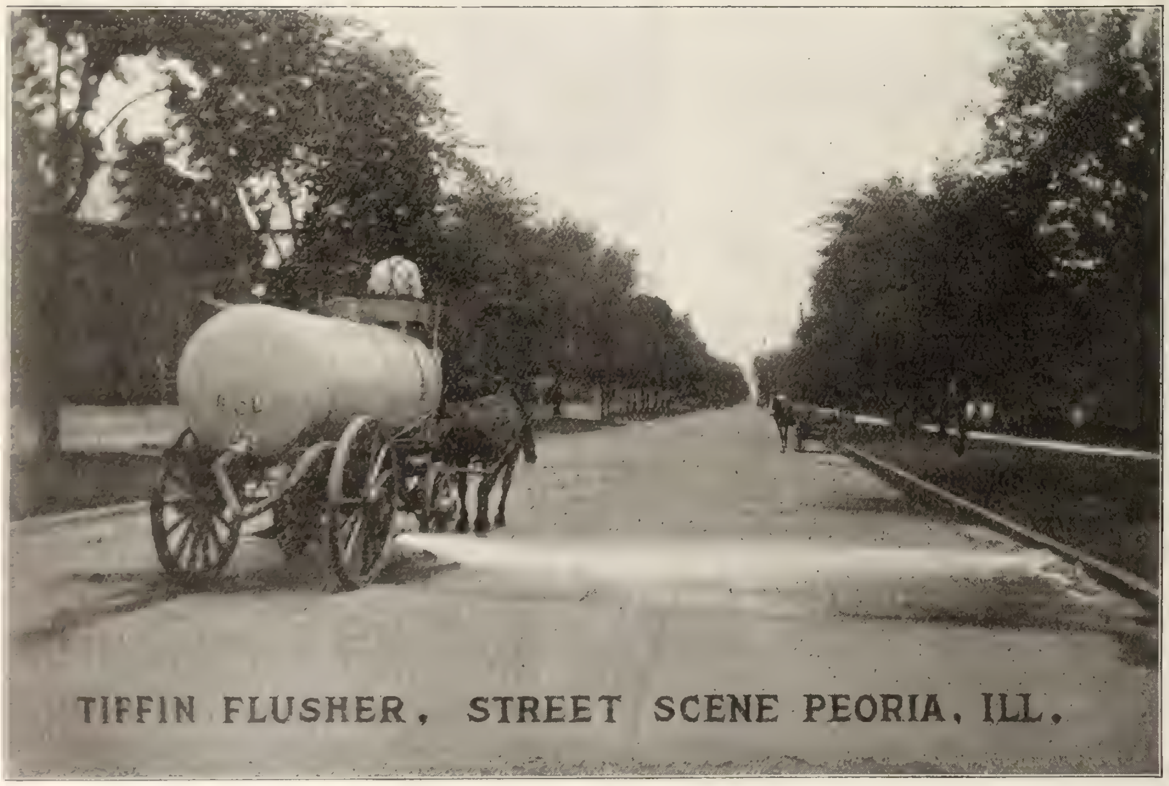

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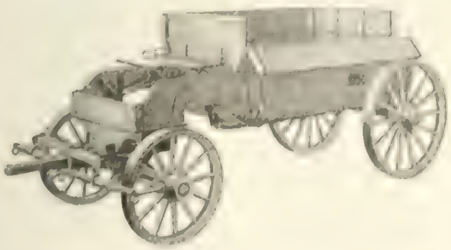

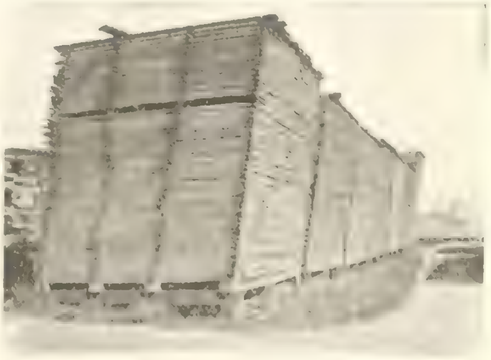

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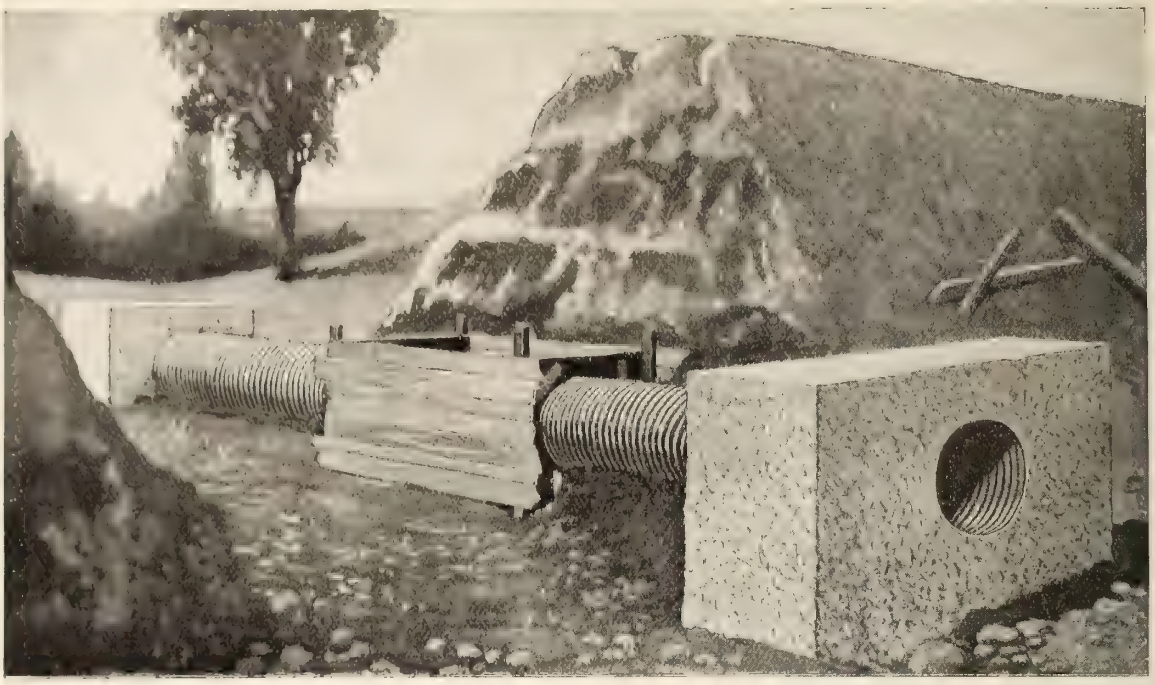

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Triplex Power Pumps, Vacuum Pumps, Centrifugal Pumps, Steam Pumps, Condensers

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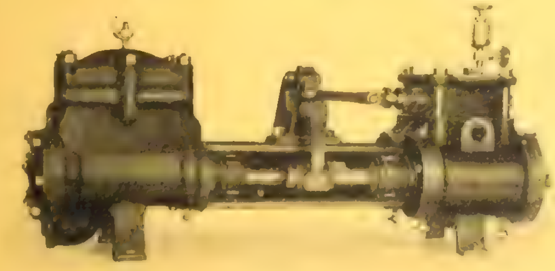

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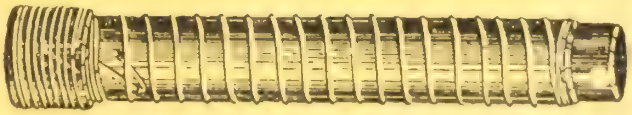

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IS THEIR EXCELLENT APPEARANCE

After much experience these people tell us that

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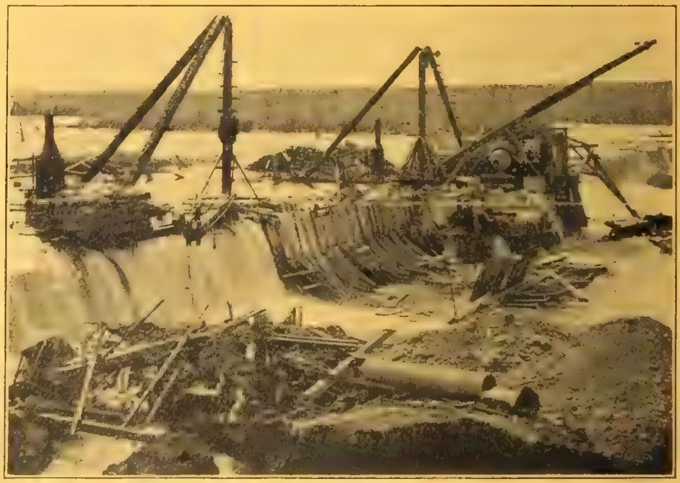

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They only cost a few dollars more than others.

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"Factories and Warehouses of Concrete"

THIS handbook of practical information on modern fireproof construction was compiled—at great expense—to fill a real want, to supply reliable data on a subject in which every architect, engineer, contractor or prospective builder is intensely interested.

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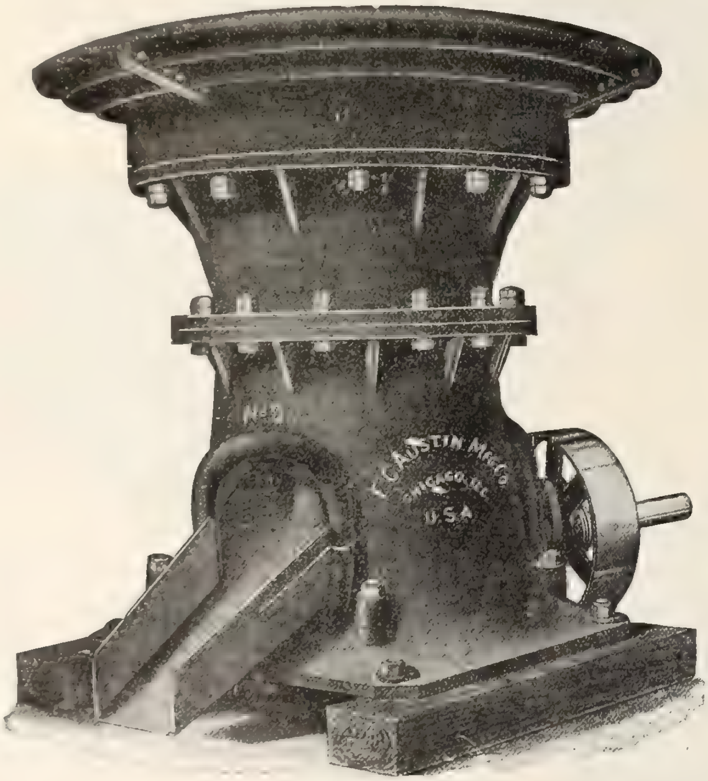

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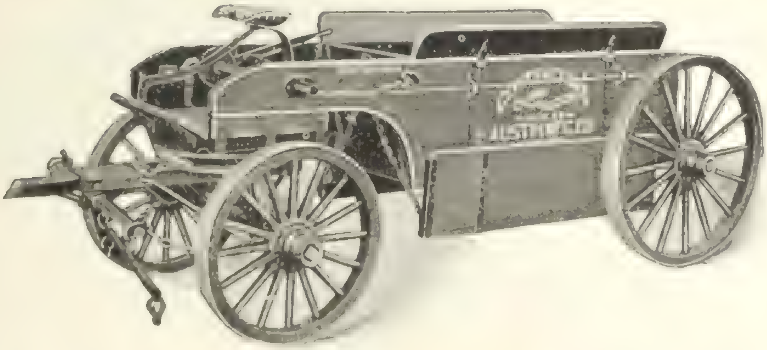
Short Wheel Base. Easy Draft.



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(Continued on page 12)

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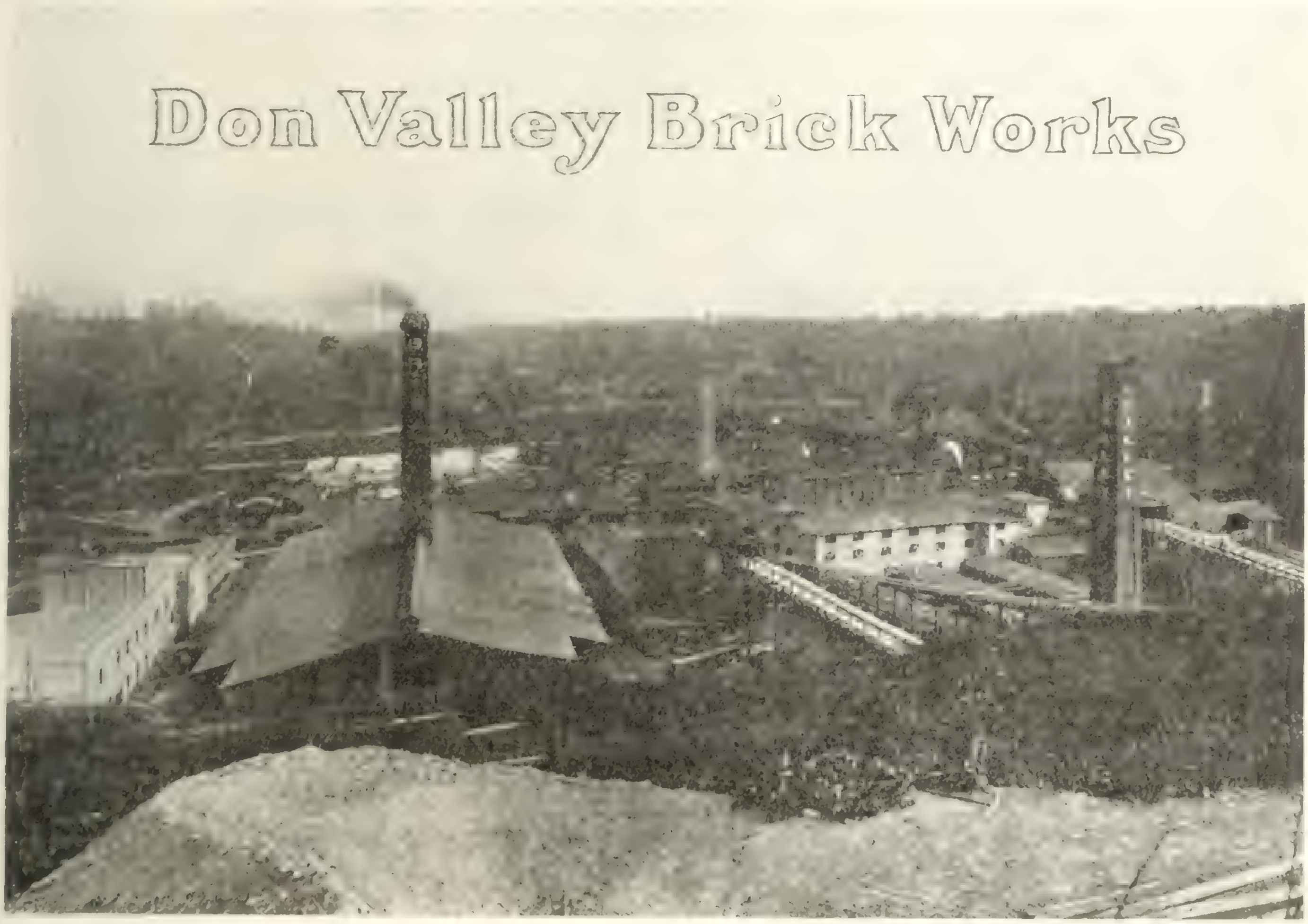

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Most Mixing Least Fixing

The M-C Mixers don't even know the meaning of the words 'Repair Bills'

Most Mixing Least Fixing

Wouldn't you like to feel that your mixers were going to work throughout the season with all parts intact?

Wouldn't you like to turn into profit the money you spent last year on spare parts and repairs?

Get a catalogue of the Famous **M-C** "*Rail Track*" Mixers and study the details,—it is the details which count.

WRITE US TO-DAY

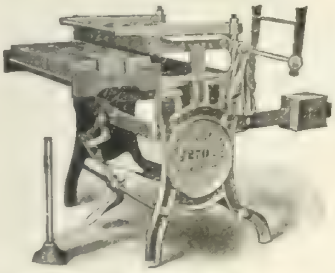
The Ford Iron Co.
MONTREAL Limited

Before you Buy Machinery or Equipment of any kind

write to us for our 1912 CATALOGUE. It will save you TIME and MONEY. Do you know that we are the ONLY LARGE MANUFACTURERS who specialize on

Concrete Machinery and Contractor's Equipment

The following is a few of our lines


London Cement Brick Machine

London Standard Drum Batch Mixer in Five sizes any kind of Power or Equipment.

Drum Paving Mixer with Forward Loader and Rear Discharge.

Drum Paving Mixer with Side Loader and Rear Discharge.

London Automatic Batch Mixer No. 1

Automatic Batch Mixer. Two sizes any kind of power.

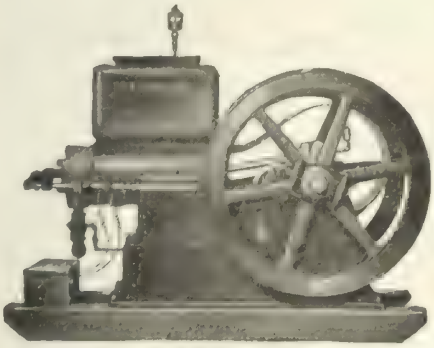
Mortar Mixers.

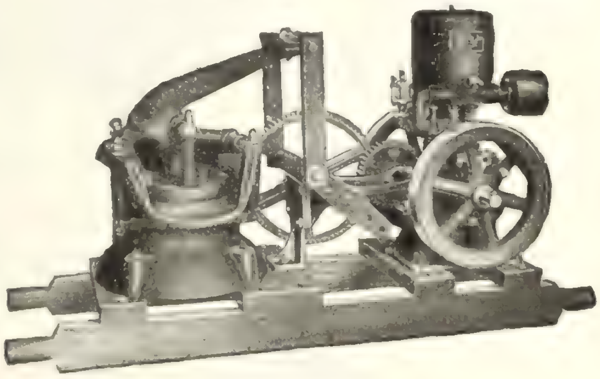
Hand Power Concrete Mixers.

Tile Moulds.

Cement Block Machines.

Cement Brick Machines.


Standard Gasoline Engine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Cement Tile Machines.
Side Walk Tile Machines.
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Rock Crusher.
Screen and **Elevators.**
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Screening Machine.
Gasoline Engines.
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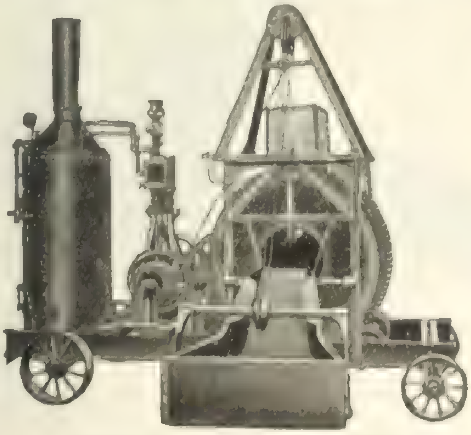
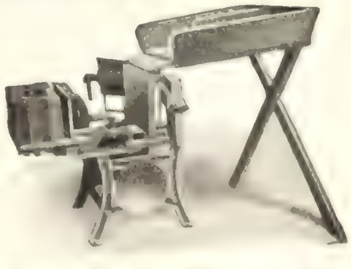
Gasoline Hoists.
Sidewalk Forms.
Material Elevators.

Driers both Portable and Stationary.
Fence Post Moulds.
Concrete Carts.
Wheelbarrows.


London Standard Drum Batch Mixer


London Face Down Concrete Block Machine

And a complete line of Cement Working Tools.

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

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Winnipeg Office: 445 Main St. Winnipeg, Man.

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The Foss & Hill Machinery Co., Montreal, Que.
G. B. Oland, Halifax, N. S.
Hamilton Machinery Co., Calgary, Alta.
B. C. Equipment Co., Vancouver, B. C.

We are the Largest Manufacturers of Concrete Machinery in Canada

WETTLAUFER HEART-SHAPED MIXER

The Heartshape Drum

Gives

Quick Charging
Quick Mixing
Quick Dumping

The Heartshape Mixer

ensures

Long Life

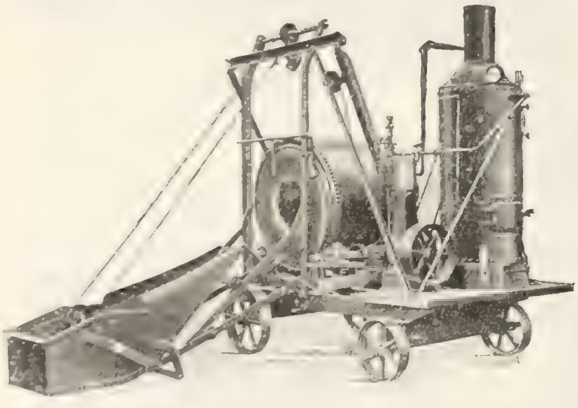
and

Perfect Work All the Time.

YOU CAN'T GO WRONG

in buying a "Wettlaufer Heartshape Mixer." There is not an atom of doubt that these Mixers will do the best work. Come and see it working and we will prove conclusively to you that

IT IS THE BEST MIXER ON THE MARKET



Automatically Controlled

One man operates the entire machine

Write for 1912 Catalog

The purchase of a reliable mixer of recognized make at the outset of a contract will save you money and time all along the line.

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

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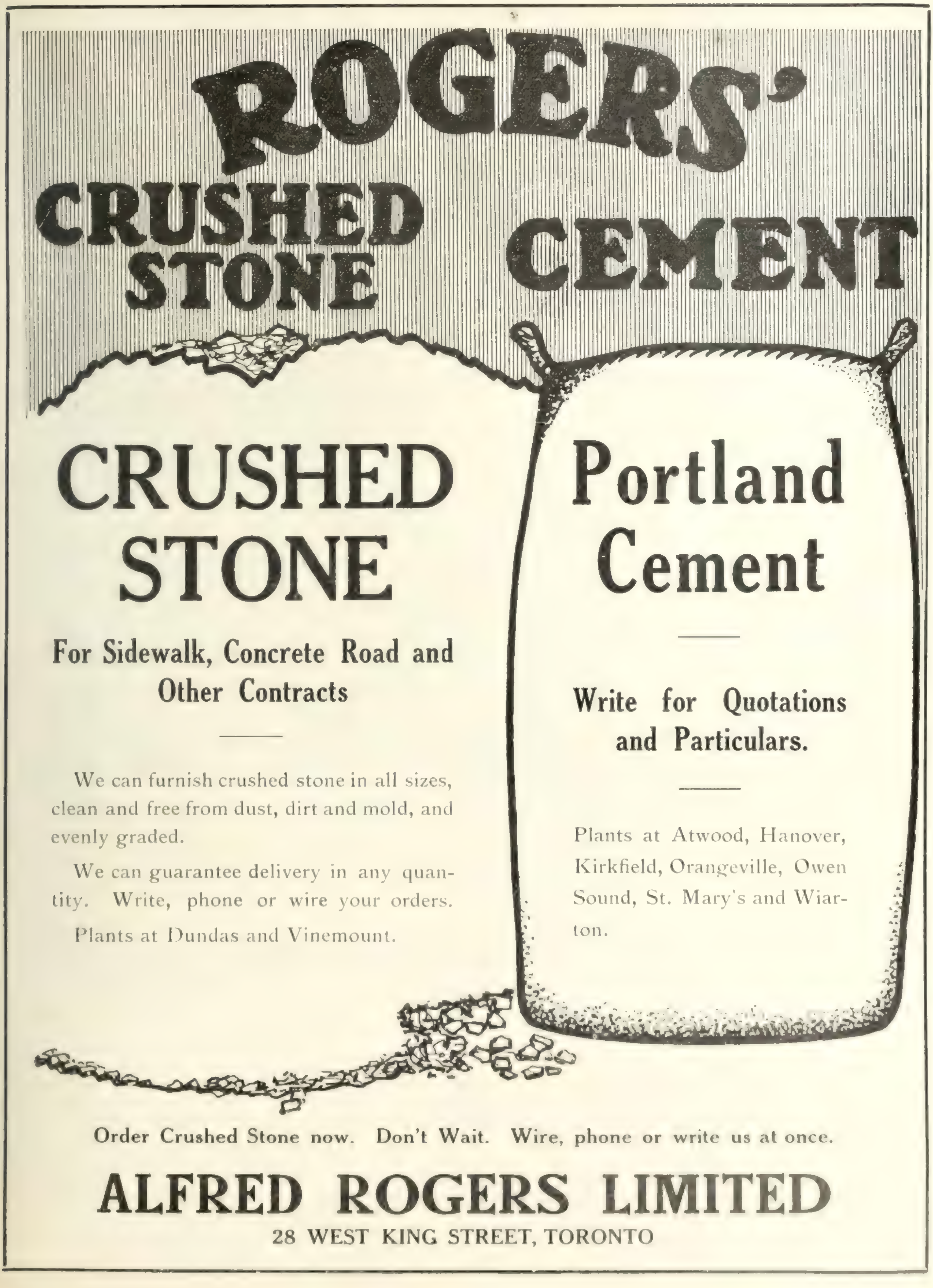

ROGERS'

CRUSHED STONE

CEMENT

CRUSHED STONE

For Sidewalk, Concrete Road and Other Contracts

We can furnish crushed stone in all sizes, clean and free from dust, dirt and mold, and evenly graded.

We can guarantee delivery in any quantity. Write, phone or wire your orders.

Plants at Dundas and Vinemount.

Portland Cement

Write for Quotations and Particulars.

Plants at Atwood, Hanover, Kirkfield, Orangeville, Owen Sound, St. Mary's and Wiarton.

Order Crushed Stone now. Don't Wait. Wire, phone or write us at once.

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28 WEST KING STREET, TORONTO

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Durable Roads

For the **highest efficiency** in waterproof macadam road construction—for the most durable, dustless, waterproof, trafficproof roads at the **lowest cost** per mile per year of service—engineers should specify

"Pioneer" Road Asphalt

Road experts everywhere are enthusiastic over their success with "PIONEER."

If interested in **durable** road construction write us for specifications and data.

Build up your old macadam roads by using **"Pioneer" Road Surface Asphalt.** Makes a smooth, rubbery surface—and one application will lay the dust for an entire year! Write for specifications on **Road Surface Asphalt,** also on **"PIONEER" Filler Asphalt and "PIONEER" Paving Cement.**

The Canadian Mineral Rubber Company, Ltd.
503 Canada Building, WINNIPEG

An Inexpensive Mixer for Sidewalks or House Foundations

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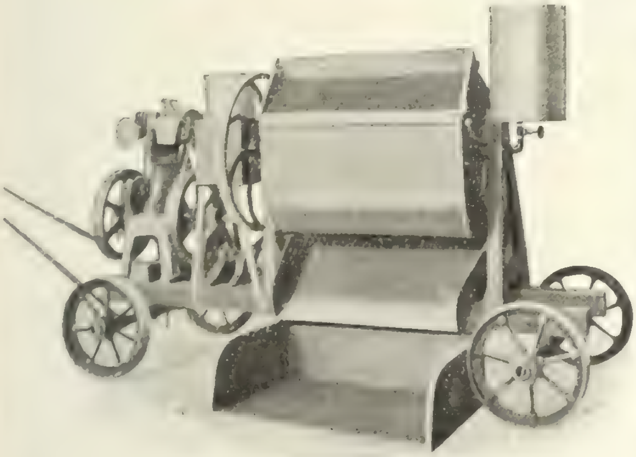

The General Machinery Co., Ltd.

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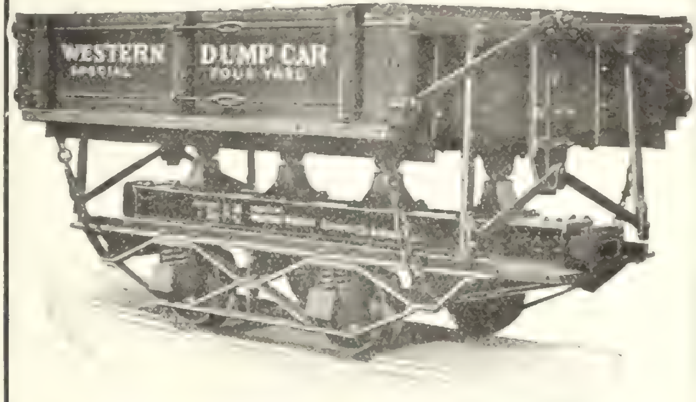
Toronto, Ont.

The Contractor's Dump Car Without a Blemish

with the ability to do the hardest service is the

Western Special 4-Yard Car



All castings malleable, beds supported by four heavy pedestals and hinges; 20″ wheels; forged axles, M. C. B type with collars and dust guards; couplers broader and deeper, giving greater wearing surface and with yoke attachment; steel I-beam draft beam.

This car has also the celebrated Western features: pivotal doors, steep dumping angle, enabling it to be dumped easiest in shortest time, loose hinge construction, two springs over each journal, improved door construction. Not a detail neglected.

Our catalog describes the largest line of dump cars, earth and rock handling machinery made, Write for it.

Western Wheeled Scraper Company

Aurora - Illinois.

Be Prepared

for any Contract that may come along, being sure that all your Equipment is RELIABLE.

WE MANUFACTURE

Dump Cars, Axles Wheels, Etc.

and our products have given general satisfaction.

Write for references.

Enquiries and correspondence respectfully solicited.

The Smith Foundry Co.

LIMITED

Manufacturers of Contractors' Needs of Every Kind.

FREDERICTON, N. B.

"HAGERSVILLE"

CRUSHED STONE

FOR

CONCRETE AND MACADAM

The Toughest Stone for
Macadam in Ontario.

Offices and Quarries : **HAGERSVILLE, ONT.**

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Sand & Supplies, Limited,

Foot of Spadina Ave.

Stone delivered on G. T. R., M. C. R., C. P. R. and T. H. & B. Railways.

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Limited

Hagersville - Ont.

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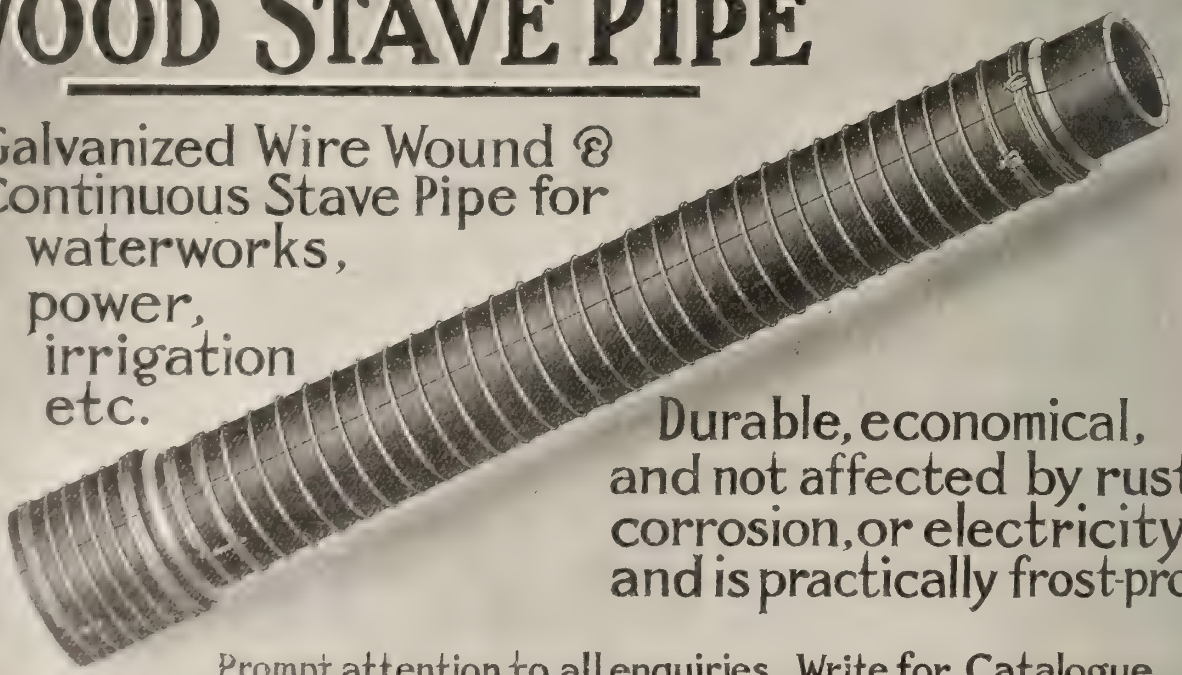
  Automatic Wood Box & Turning Company

WOOD STAVE PIPE

Galvanized Wire Wound & Continuous Stave Pipe for waterworks, power, irrigation etc.



Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

The Dominion Wood Pipe Company, Limited
New Westminster, B.C.

Tarvia

Preserves Roads
Prevents Dust~

Mount Pleasant Cemetery Toronto. Roads built with Tarvia X in 1909.

Two Years' Trial in Toronto

THE above roadway in Mount Pleasant Cemetery, Toronto, was built with "Tarvia X" in 1909. The photograph was taken in the fall of 1911 and gives a fair idea of the excellent condition of this road, after two years of travel.

In the background this road has a five per cent. grade and if ordinary macadam had been used, the surface would be raveled and worn out long ago. The best demonstration of the success of Tarvia is that the Cemetery authorities, after two years, are going to use a great deal more of it, as the following letter from the Superintendent shows :

Dear Sir, — February [illegible], 1912.

I wish to let you know we will require "Tarvia X" to build about [illegible] road this year about the end of July.

I may say that we are well pleased with our Tarvia roads. The first that were made in 1909 have stood the test of traffic and heavy [illegible]

Where our roads have a 7% grade we find the Tarvia fills the bill; no washing, no dust, easy to sweep and clean in wet weather. (Signed) W. H. [illegible]

Tarvia is a dense, viscid tar product of great adhesive power. When built into the road as a binder, it forms a matrix about the stone, keeps the stone in position and furnishes an element of plasticity which greatly prolongs the life of the macadam under heavy loads or automobile traffic. There are three grades for different types and conditions of roads.

Booklets regarding same free on request.

THE PATERSON MANUFACTURING CO., Limited

MONTREAL TORONTO WINNIPEG VANCOUVER ST. JOHN, N.B. HALIFAX, N.S.

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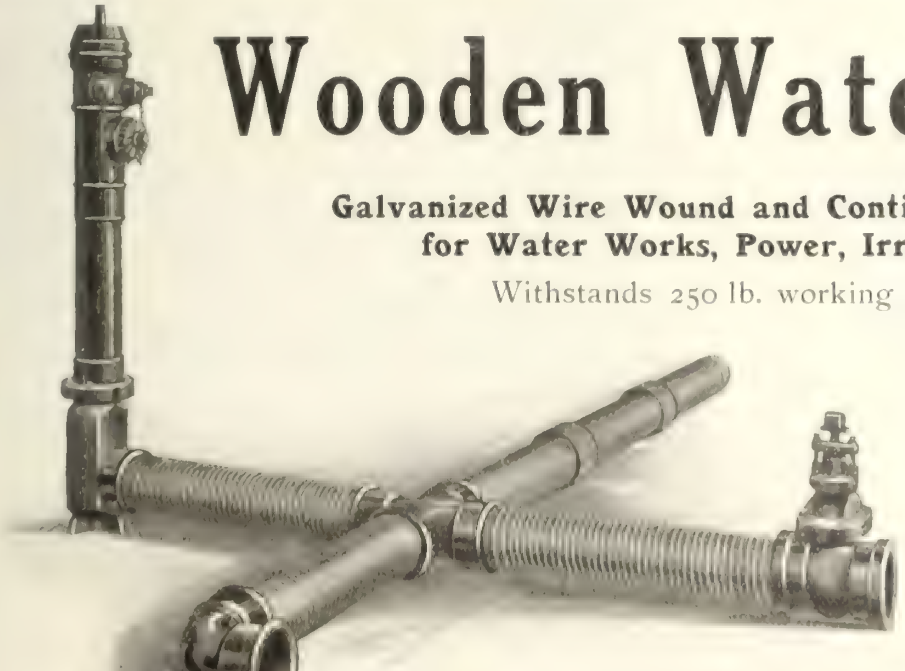

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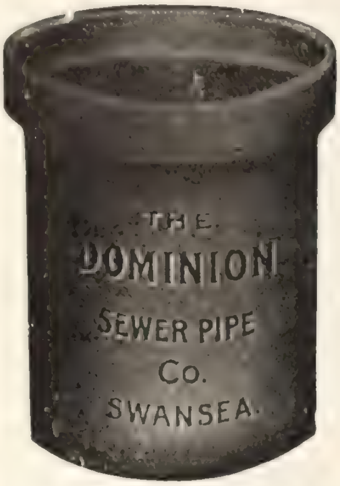

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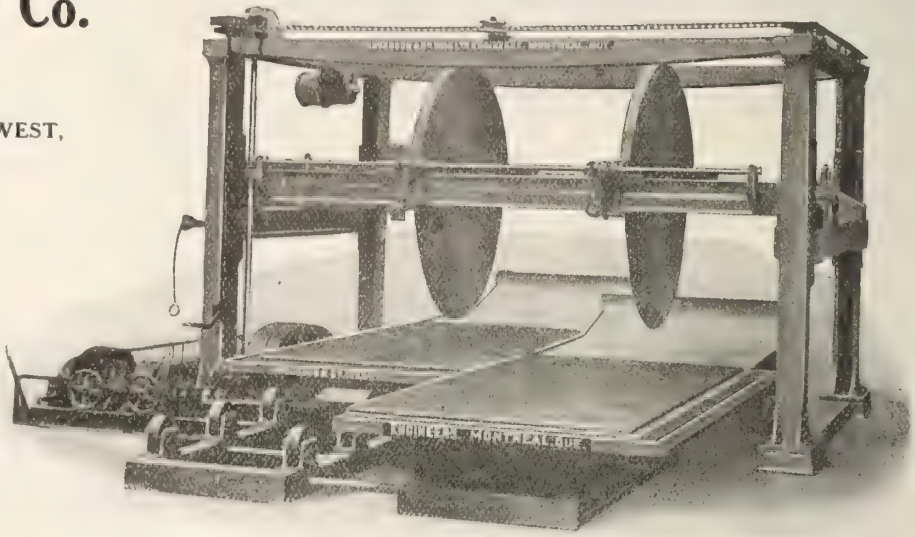

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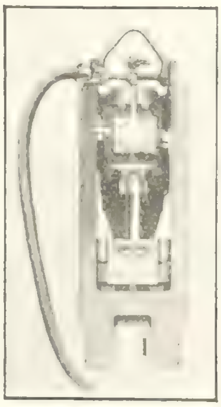

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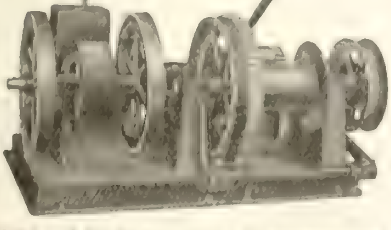

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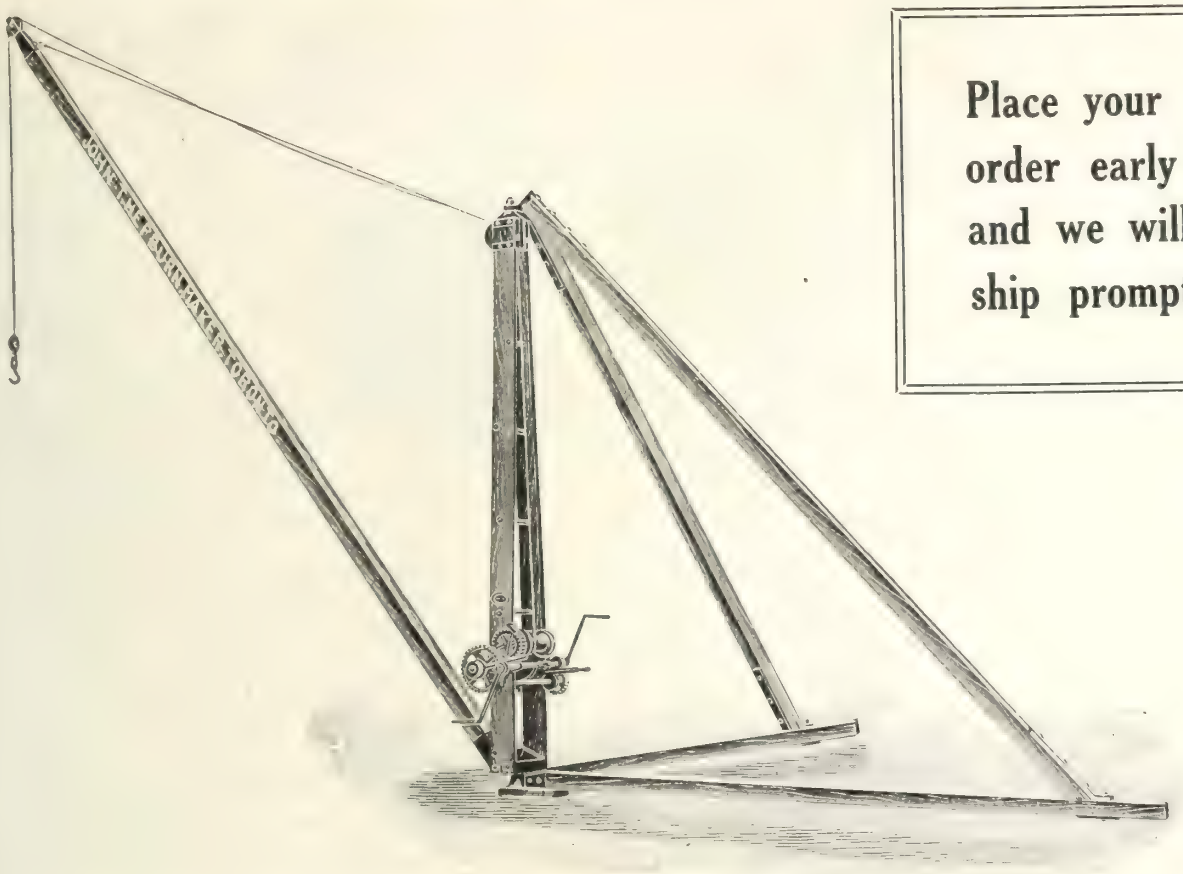
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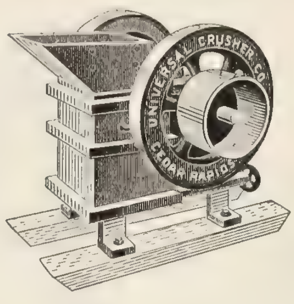

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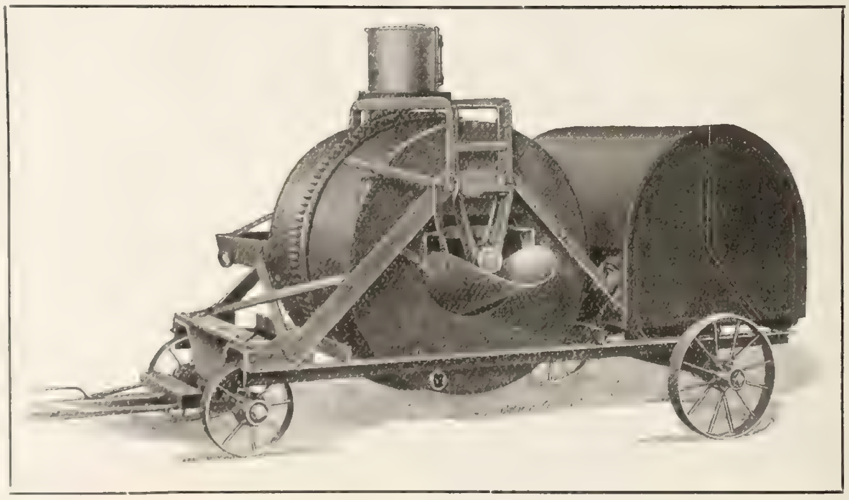

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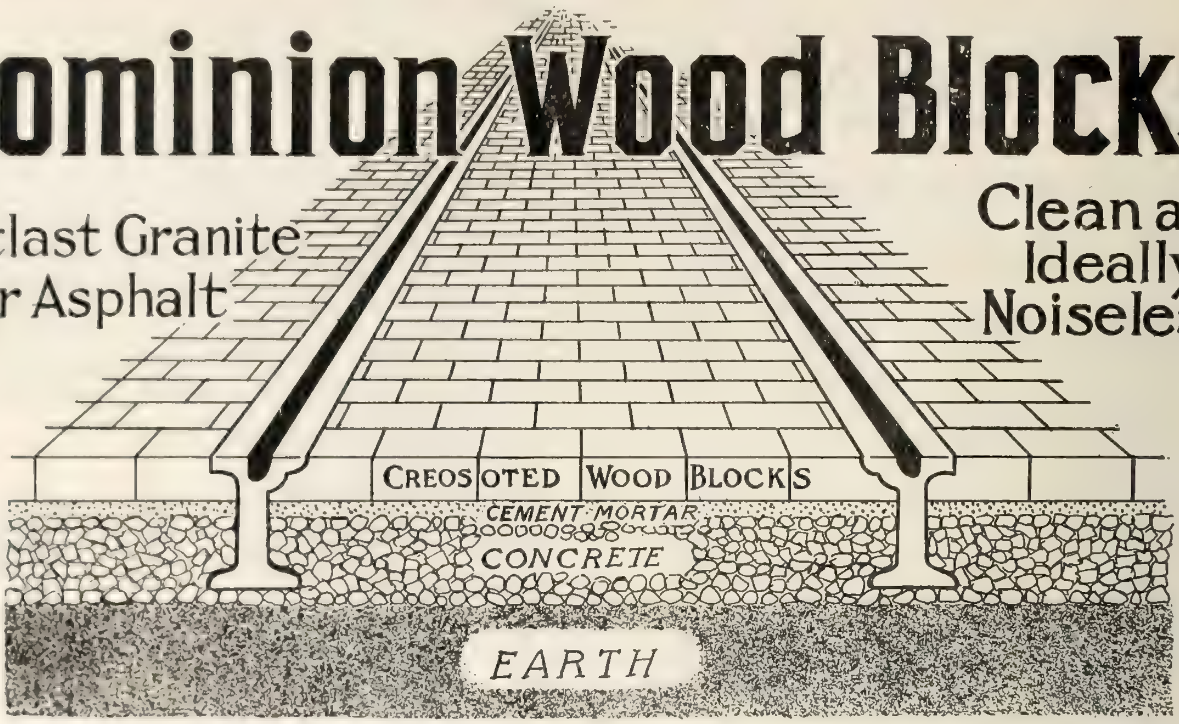

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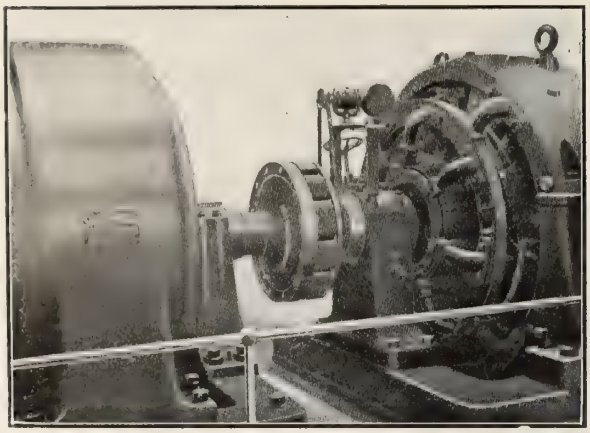

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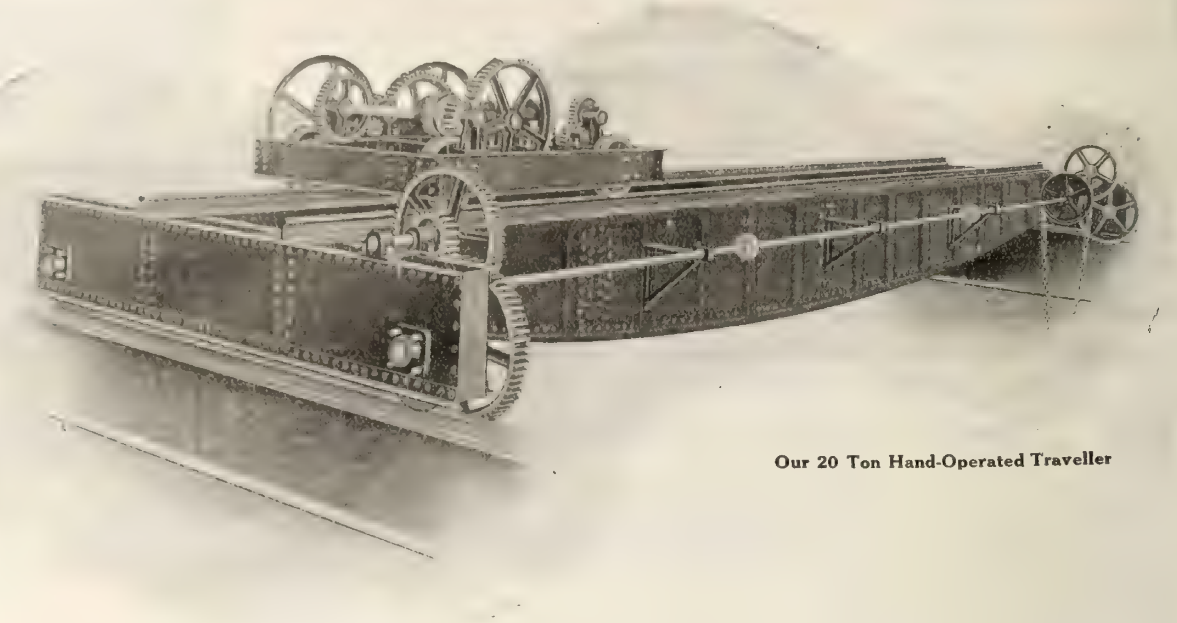

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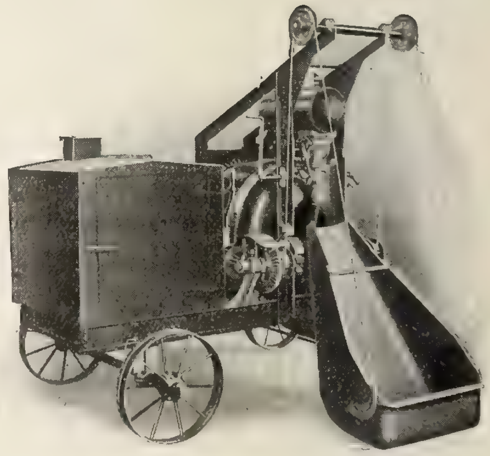

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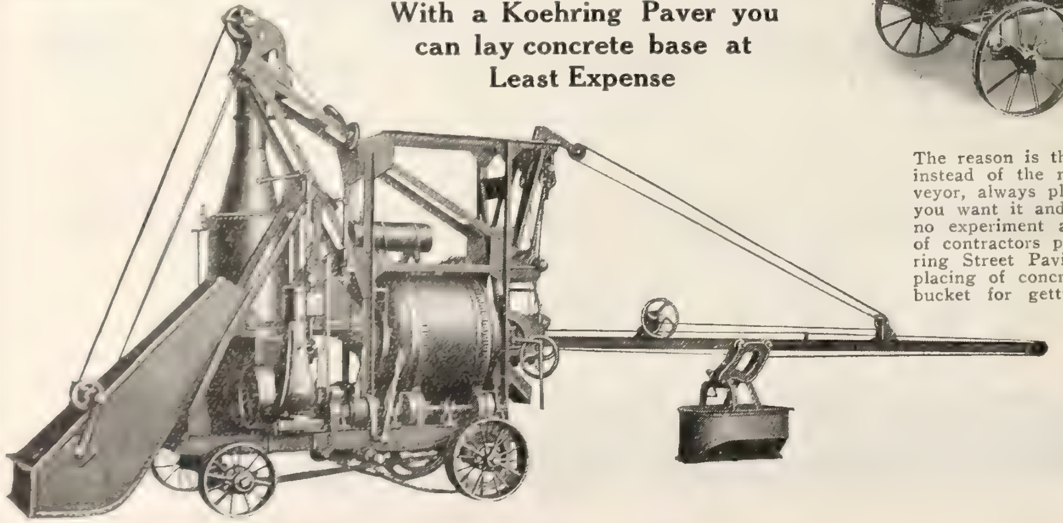

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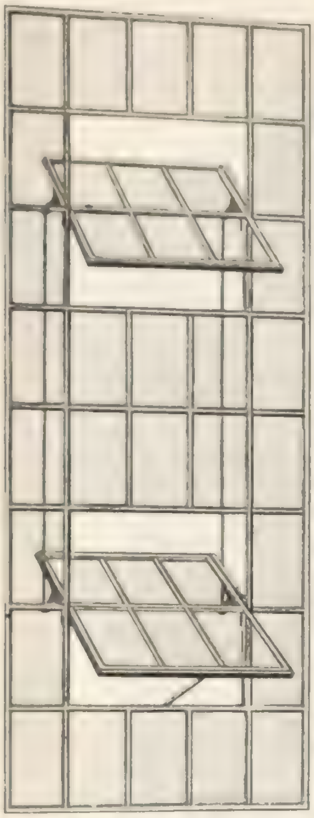

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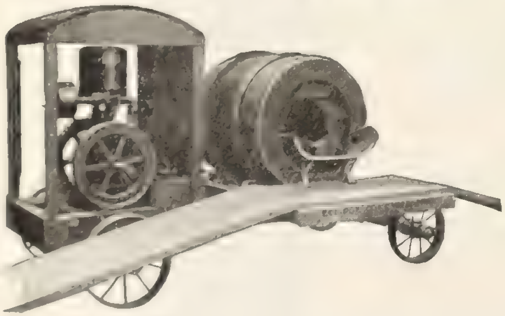

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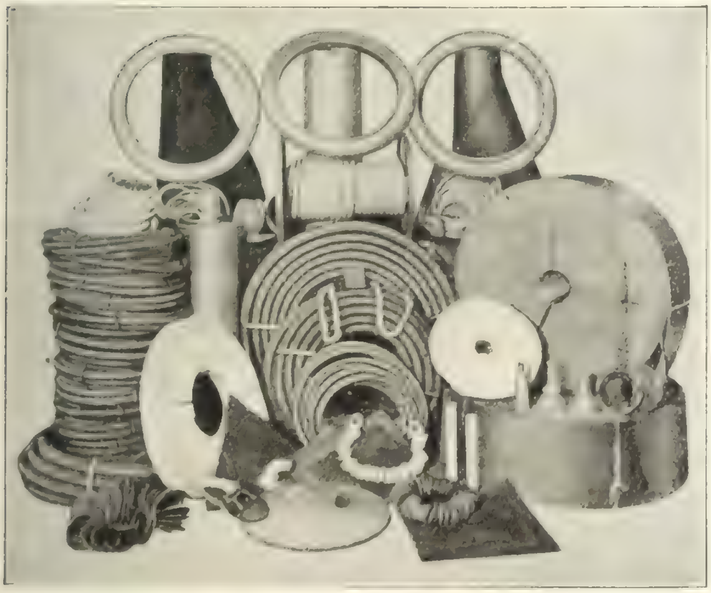

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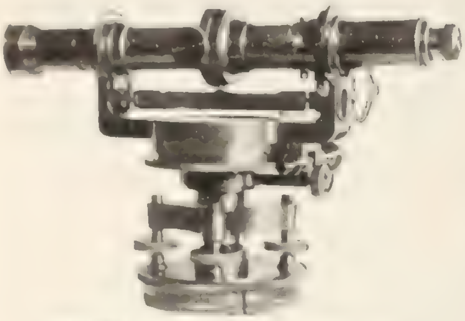

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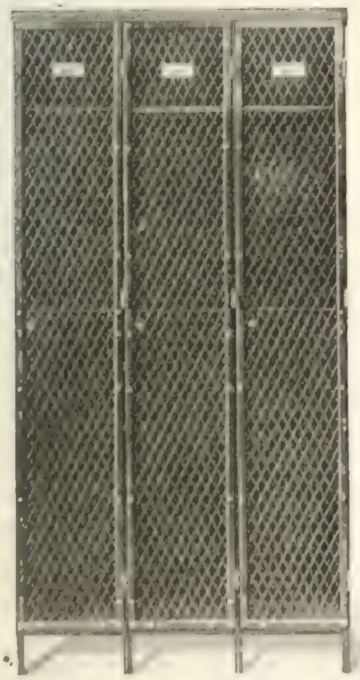

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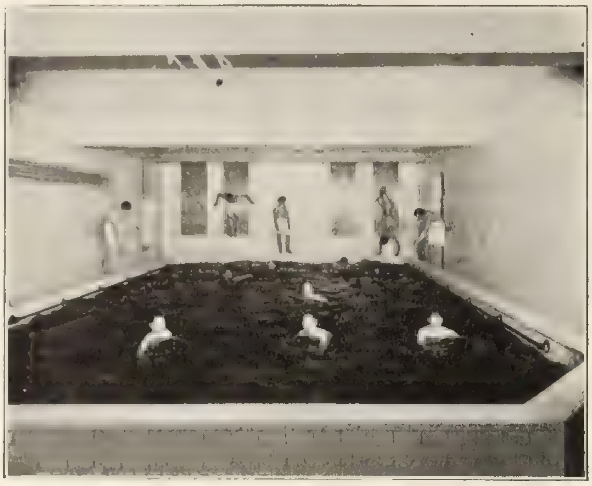

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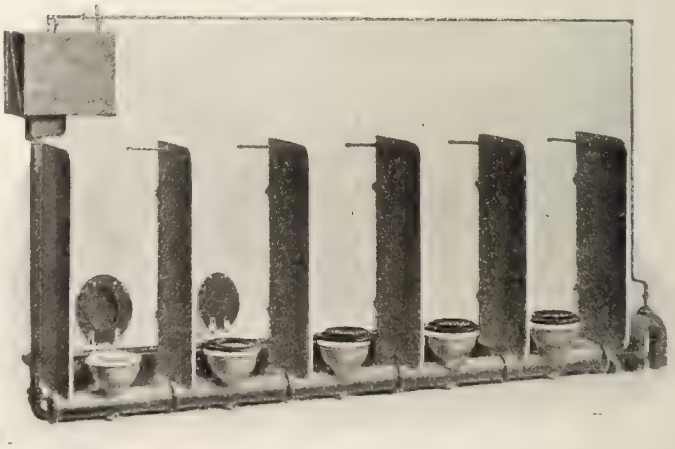

Plate F. 517

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Vol. 26 May 22, 1912 No. 21

The Engineer as a Writer

SOME of the common faults of engineering articles are outlined in an interesting letter contributed to our contemporary, Engineering & Contracting, Chicago. The writer in question complains that contributors to engineering periodicals have a tendency to enlarge too much upon general descriptions of work, paying altogether inadequate attention to those features which make one piece of work differ from another or to those which present special difficulties. By way of illustration the writer states that recently in Cuba, in connection with the design of a reinforced concrete conduit for a water power plant, he searched through many numbers of the leading engineering publications in the hope of finding some data on the subject of coefficients of friction in concrete pipes, but was unsuccessful in his search and was obliged to fall back upon text-book data. He concludes:

> "I believe that an article should state what constants were selected for the design; if a particular section was chosen, what were the reasons which determined that shape of section; if any particular type of machinery was selected, why; if any particular difficulties were encountered, how were they overcome, etc."

This subject of writing articles descriptive of engineering work is of such outstanding importance, especially in so far as it concerns the work of engineers in Canada, that it is worthy of more than passing attention. We cannot do better than to reproduce the editorial comment made by our contemporary. The principles contained therein will be endorsed by all those having to do with the publication of engineering literature:

> Tell clearly what was done and why, how it was done and what it cost. This direction is given daily by the editors of this journal in arranging for contributions. It comprehends the essentials of the ideal engineering article. Like other ideals the ideal in article writing seems difficult to reach. Contributions telling what was done, describing the structures built and their purpose, are plentiful. Contributions which describe in a general way plant and construction methods are also comparatively common. In fact no difficulty confronts the editor until he attempts to secure explanation why one design instead of another or one construction method instead of another was adopted. This difficulty is multiplied when in addition to why a thing was done one asks for a cost analysis of the work.
>
> A contribution from a valued subscriber criticizes with more than usual acumen the character of the articles in engineering periodicals. The writer does not refer in his remarks merely to the engineering newspapers, but includes society journals and proceedings. The faults he complains of are common in greater or less measure, he contends, in all engineering periodical publications. This is without question true, and it indicates a fact which the engineering editor knows well but which the reader of a journal like this does not often realize. This fact is that the engineer designer or constructor can be induced only with difficulty to explain his reasons for a particular design or construction method or to give evidence of the economic efficiency of his labor. He will tell freely what he did but he will not tell freely why he did it or what it cost.
>
> We are not certain that we know the reason for this fact. It should not be the fact. It is not because of lack of effort or of understanding on the part of editors who seek articles for publication that it is the fact. Neither can engineer readers fail to realize that it is a fact indicating a real deficiency in engineering literature. The engineers who described the conduits referred to by our correspondent and did not give the coefficients of friction and other design factors certainly were not ignorant of the vital value of such information. Why then were these data not made known? Why are not similar data always made known instead of being quite commonly omitted?
>
> There are various conceivable reasons. One of them is the notion that the statement of such data verges perhaps on triviality. Another is that the statement may offer a handle for criticism or censure. In the matter, for example, of the coefficients of friction just mentioned, the designer assumes that the figure is standard and well known and, therefore, is unnecessary to specify, or he has deduced and used a figure of the justification of which he is uncertain and which, therefore, to avoid criticism, he suppresses. These may not seem to be forceful reasons, but there is no reason why certain classes of data are omitted from engineers' descriptions of design and construction. Editors of engineering journals have to combat them frequently and often unsuccessfully. Obviously neither reason has scientific justification. If the constants or formula employed are standard the statement of this fact establishes the validity of the design and makes the information given precise and complete. If these factors are not standard then both they and their derivation should be stated so that the science of design may be advanced by proof of their correctness if they are correct or by demonstration of their error if they are erroneous.
>
> It is most likely to be the novice in the profession who is most influenced by the reasons just cited. The experienced enquirer fails in detail explanation for another reason. By his experience he is familiar with many means and methods and they have all become commonplace to him. Therefore he [illegible] them [illegible] part of an account of an engineering work. It is from the experienced engineer that the editor receives the most general of the general descriptions that are published in engineering journals. We have no license, perhaps, to expect that the old trained engineer shall in his written article

[illegible] the manner of design and construction, but we [illegible] expect that he shall present broadly the design and construction economics of his problem and its solution. To say that "careful study of the conditions showed the design or construction adopted to be the most economical and efficient of several possible ones" falls lamentably short of completeness. It is, however, a wearisomely familiar statement to editors. Obviously if the design adopted was the most economical the facts of real importance to engineers are, why was it so and how was this determined?

Another reason for lack of essential data in engineering articles is the fear of giving away some secret of value. This feeling is naturally most common among contractors, and it is held most strongly with respect to costs. Most of our readers know the stock arguments against disclosing cost data, and we have often exposed their fallacy, therefore, we shall not consider them here. The fact is, however, that this charletan-like reluctance to disclose secrets of the trade prevents many engineering articles from being of greatest value, and the editor must take what he can get and not what he would like. So far, too, as cost data are concerned engineering articles frequently lack them because neither the engineer nor the contractor know, except possibly in round total, what the work has cost.

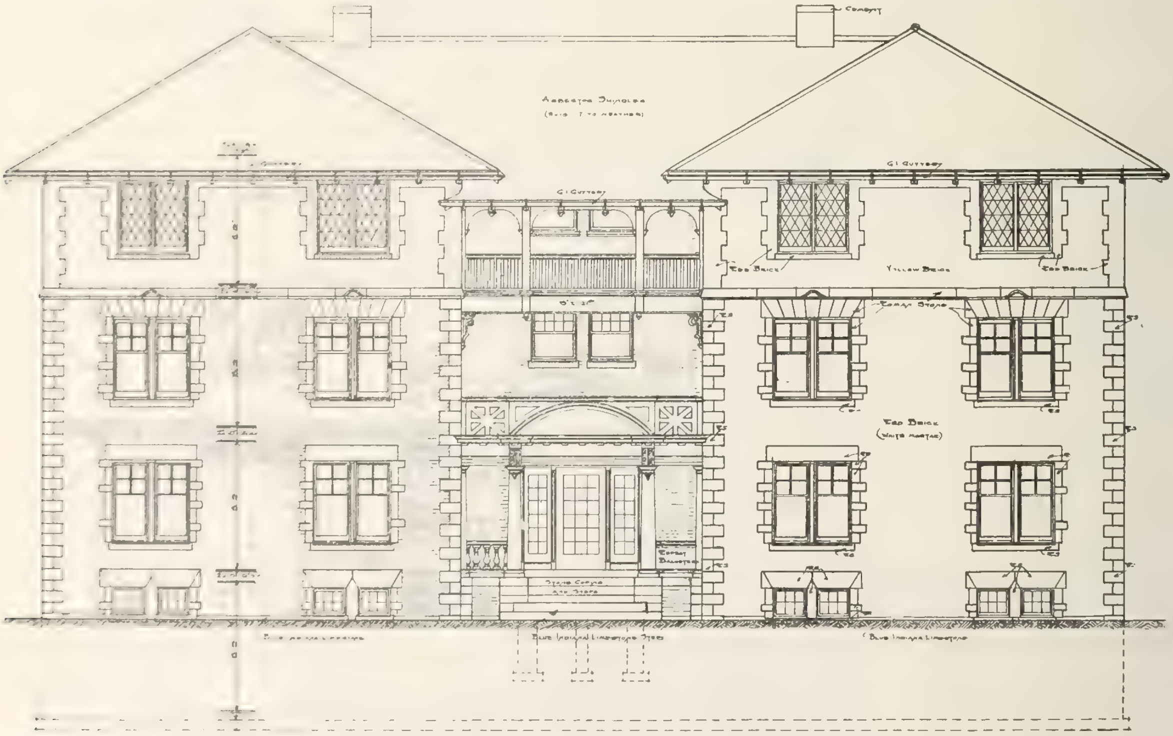
One might easily continue listing reasons why engineering articles are faulty in the respects mentioned by our correspondent, but sufficient has been said to indicate that the main reason is the engineer himself. The engineer as a writer does not write what the engineer as a reader most wants to read.

Prohibition of Apartment Houses in Residential Toronto

THE city of Toronto has passed a by-law which prohibits the erection of apartment houses in practically all residential districts. Power to enact this measure was conferred upon the council by an act passed at the last session of the Legislature and the by-law was given three readings on Monday of last week and forthwith became law.

The measure has been productive of a great deal of unfavorable comment among property owners, architects and builders. It is generally felt that such an enactment is not only unfair to those who have recently purchased property—in many cases at a high figure—for the express purpose of building apartment houses, but that it is altogether inconsistent with the rapid development of the city and the demand for accommodation within easy access of the business districts. Those who are familiar with this class of building in other cities where the legislation affecting it has been less stringent, contend that where the structures have been properly designed, and where the design has been made to conform with the surroundings, the erection of apartment houses has not in any way depreciated the value of property in the neighborhood. To prohibit the erection of these buildings in all residential districts without attempting to arrive at a saner solution of any problems that may have arisen can only be regarded as a stupid blunder on the part of the authorities, if not as evidence of undue influence that has been brought to bear.

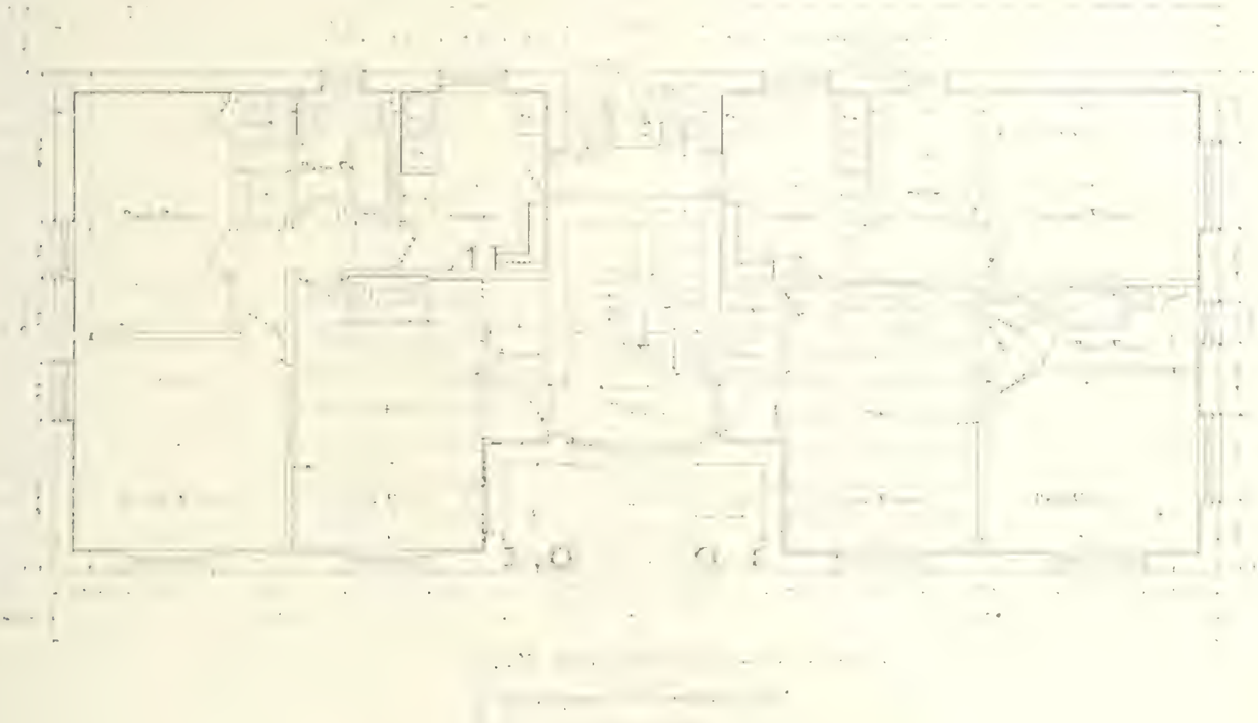
Upon the face of it one cannot help thinking that the city council would have been better advised had they given such an important matter more deliberation. Toronto is rapidly becoming overcrowded and yet its extension has been hampered on all sides during the last few years. The authorities are ready enough to approve by-laws of this kind, but they concern themselves little with providing facilities for reacing the suburban districts. The means of transportation in Toronto are miserably inadequate and on all sides there are evidences of lost opportunities in the planning and development of the city. A study of apartment house building in some of the largest cities across the border is illuminating as to its possibilities.



Apartment House for Mr. Frank Babcock, designed by Messrs. Edwards and Saunders.—Rejected under Toronto's New By-law

The city council of Toronto have not concerned themselves with these possibilities and the mistakes that have occurred in Toronto are attributable to defective and short-sighted regulations and not to any outstanding defect in a system.

In anticipation of the enactment of unfavorable legislation the number of permits for apartment houses taken out recently in Toronto has been unusually heavy, but the measure has fallen hard upon those whose plans were in course of preparation. We present herewith plans by Messrs. Edwards & Saunders for an apartment house on the corner of Avenue and Foxbar roads. The owner, Mr. Frank Babcock, was one of a number of those whose plans will probably be frustrated by the measure passed by the city council. As will be seen, the design for this building is quite an attractive one and we cannot but think that such an instance as this, which is only one of many, affords sufficient ground for reconsidering the measure.



First Floor Plan Babcock Apartment House

We are of opinion that the regulations affecting structures of this class should be administered by an independent board of arbitrators having expert knowledge. The centralization of a little influence should not govern in such matters. Of course, the city council's by-law will be hailed with acclamation by a few, but the reasons given for this enactment constitute a miserable apology to the building public at large.

A concrete fire test on a large scale occurred recently at the Blabon Oil Cloth Works in Philadelphia. A four-storey concrete building with wired glass skylight was used as a drying plant for long strips of linoleum, which hung down from iron bars at the top. There were no floors in the building, which was practically a shell. The linoleum caught fire and burned up, and the building was uninjured, although the fire is reported to have lasted several hours.

"Nerve" in the Contracting Business

THERE are many ways and methods for contractors to expand their business. A list occupying a column could be set down. Ask anyone what is the most essential thing to assure success and make a contractor's business expand, and in ninety-nine cases out of a hundred the answer would be "Ample Capital."

As necessary as capital is, yet in the writer's opinion there is one requisite that is more essential than capital, namely, Nerve. It is true that nerve must be accompanied and backed up with integrity, judgment and capital, but without the necessary nerve or backbone, a contractor will never obtain a large business. The same characteristic may be given many other names as bravery, backbone, tenacity, foresight, determination and others, but among contractors it is called nerve.

History is replete with men who have achieved success through their nerve. Alexander, ruler of the small kingdom of Macedonia, conquered the world. Napoleon, born a poor boy, stirred all Europe and won for himself an imperial crown by nerve. Lincoln won his proud distinction by determination. Vanderbilt, Gould and many others of the modern financiers, made their fortunes by nerve.

Many successes have been achieved in the contracting business by nerve. A prominent contractor of New York City undertook a large contract in a foreign country some years ago, and on the day he signed the contract he had spent his last dollar and that night when he went to bed he only had a quarter in his pocket. The next day he arranged for ample backing and carried out his contract successfully.

A contractor of the middle west, who to-day is a very wealthy man and controls several railroad stations, started out in the construction field as a teamster, and by hard work and frugality soon owned teams of his own and was doing contract work. In

1884 the railroad for which he was working went into the hands of receivers and he lost all he owned. Again, after getting another start, he lost out on a contract within a few years, but he never lost his nerve, and within a few years he had under way contracts amounting to several million dollars, clearing in one year about half a million dollars in profit. This was done by nerve, coupled with other ability.

Another prominent contractor has shown his nerve by undertaking contracts of any kind and any size. He considered that a job could not be too small or too large for him, and that no job was too difficult. Even when he was financially involved, he never lost his nerve, but believing in himself and his own luck, he swept all difficulties aside and went on to success.

Many examples like these can be cited. The writer knows of the case of a man who walked into a town penniless, and yet when he learned that a railroad contractor wanted to sublet some masonry work he had the nerve to tackle the job, obtain the necessary tools and supplies, and he made money on the work. In other cases contractors have spent their last cent to obtain a contract, and then shown their nerve in getting started. Two brothers started a piece of work by borrowing picks, shovels and wheelbarrows from their neighbors until they had earned an estimate to purchase more and have teams to put on the work. When they finished this job, they owned a small outfit and had about four thousand dollars in cash, enough to start a much larger job.

One might say that there are cases of where men have had nothing to risk and all to gain, so that it was not difficult for them to show their nerve. This is true to some extent, but the world is full of men who have had similar opportunities, and of men who have possessed a good paying business, yet when misfortune overtook them, or when a good chance was offered them, they lacked the nerve and push to go ahead. Others have gone out and made the opportunity, while thousands are like Mr. Micawber, always waiting for something to turn up.

Often the One Thing Lacking

But a man with ample capital and a good going business often shows a lack of nerve. This is sometimes due to a man not having much ambition, that is, he is easily satisfied, and if he is making a little more than a living, he believes that is enough. Others have the ambition, but they are timid. They hesitate regarding new undertakings and they are doubtful as to their own ability.

The habit of hesitating and waiting is always a disastrous one in contracting. Some years ago the writer was associated with a company that lost much money through this fault. If they were advised some days or weeks in advance that certain tools, machinery or supplies were needed, days and sometimes weeks were spent in consideration and discussion as to whether or not these things were actually needed, and they were only purchased when it became evident that money was being lost for the lack of them. Then a hurry order was sent to the nearest dealer and the tools and machinery were rushed to the work at a high cost.

This was in contrast to the company whose employ the writer had just left. There the purchases were anticipated, due consideration given to them, time taken to get quotations from various dealers, and the purchases made for the lowest money and the things placed on the work in advance of the time for their use. This meant that the best tools possible were bought, and for the lowest cost, extra money was not spent in being in a hurry, the work could be planned in advance to be done in the most economical manner, and money would not be lost by the forces waiting. A dozen shovels or picks might mean a loss equal to many times their cost.

Confidence With Experience

Mature consideration should always be given every detail of work, but many contractors lack the nerve to go ahead and make expenditures in advance.

So it is with large undertakings and new contracts. The young man starting out should be careful not to overreach himself. He should be cautious, not attempt too much at first, as he must learn himself and first build up a good organization. But the contractor who has had some years of experience should not hesitate to reach out for new worlds to conquer.

The fact that one may not have done the same work before or that the job is much larger than those he has previously done, should not deter him. No one man can look after all the details of any large job, he must depend upon hired help, and it is always possible to hire men experienced in different lines of work, or obtain experts to instruct his men, and it is very little more difficult to plan out a job of ordinary size than one of great magnitude. All work can be divided up into sections or different classes of work, so that the various parts can be planned as would any ordinary job.

It is seldom difficult to obtain capital for a job. First obtain the job and then money can be gotten either from banks or capitalists or else other contractors can be gotten to "go in" on the job. Another method is to do as much work as possible with one's own outfit and forces and then sublet other parts of the work, especially those for which new machinery must be purchased. A contract for a good piece of construction work is always an asset, both for obtaining capital and credit, which for some purposes may be as good as capital.

Contracting has in it certain elements of risk, so sion; then there should be no reason why a man should not keep his nerve with him, and no matter what may befall, keep at it and always have nerve enough to expand his business, and have the desire and be on the alert for new worlds to conquer. Nerve is a requisite for contracting.—The Contractor, Chicago.

Setting of cement during freezing temperatures has been investigated by United States experts. Clear water and saline solutions were both used in the mortars tested and it was found that the salts of sodium and calcium accelerated the process of setting somewhat even at low temperatures, while the salts of magnesium retarded it. It was observed that setting and hardening proceeded slowly at the low temperatures provided that the materials were mixed at higher temperatures, and such mortars when placed under normal conditions acquired a strength in time equal to those not subjected to low temperatures. However, after a lapse of 30 days under freezing condition the mortars showed a compressive strength somewhat lower than that of a seven-day mortar normally treated. In discussing the results obtained the writers recommended the use of clear water rather than saline solution for such conditions.

Letters to the Editor

"Should a Dozen Firms Figure the Same Quantities?"

Montreal, May 15, 1912

Editor Contract Record:

Your leader of April 17 under the above heading has not brought forth the response that so important a subject deserves. This would almost prove the disinclination attached to any departure from old methods, and yet I am fully convinced that if contractors would give the matter serious consideration they would clearly see that it would be greatly to their interests to adopt quantities, supplied by a qualified surveyor. Even your correspondent, the Carter-Halls-Aldinger Company, Limited, could make a great saving in their well-organized office staff. These forces have to be employed by all contractors who tender on one job. Each does the same work and must be a permanent charge on the business. Quantities supplied by the architect, or through him, would save nine-tenths of this yearly tax, and with clauses regarding errors stipulated therein, as named by your correspondent, Mr. S. H. Penlington, what have the contractors to fear?

My views on this subject were set forth in your issue of August 23 last. I will not encroach on your space further than to say that I have opened an office in Montreal as a Quantity Surveyor and shall be glad to hear from any architect desirous of adopting the system and to guarantee the accuracy of any work submitted to me.

Yours faithfully,
Jas. J. Adamson

"Motion Study in Scientific Management"

Winnipeg, Man., May 4, 1912

Editor Contract Record:

In your issue of April 10th two very interesting articles appear: one by Mr. F. B. Gilbreth, M.E., on "Motion Study in Scientific Management," and the other your editorial comment on this contribution.

The article by Mr. Gilbreth, laying down as it does an arbitrary system, is, from any experience that I have had, more theoretical than practical. To put it briefly, scientific management reduced to the point suggested by Mr. Gilbreth, is applicable only in shops where certain lines of manufacture are carried on continuously by the same men for long periods of time, or where there is repetition work to perform under identical conditions from time to time. In the ordinary shop connected with the contracting trade, where there is little repetition work and each job calls for individual methods of handling, the methods of directing the work could follow only very distantly the rules laid down by Mr. Gilbreth.

A perusal of this article does not indicate that he advocates the adoption in a minute degree of the methods suggested, in the contracting business, and for this reason it would seem that your editorial has been written under a certain misconception. It must be evident to anyone that the tendency of all men performing labor is to decrease in efficiency—that is, so far as volume of production is concerned. To be more clear, it has been the experience of most shops, where a certain standard of production has been set, that the tendency is toward a decrease rather than an increase in productiveness unless some methods are adopted to check up continuously the details of the operations involved.

It does not follow that you are making a machine of a man because by showing him where he is wasting energy and time you are able to increase his productiveness. As I understand "Scientific Management" it does not involve the speeding up of the men so far as actual useful motion is concerned, but rather the elimination of motion which accomplishes nothing. Whatever may be claimed as to the desirability of allowing a man to maintain his individuality by doing his work in his own way, there can be no question that the methods which involve the least waste are the ones which will have to be adopted even at the cost of subordinating individuality to uniformity of production.

There is no question that the haphazard methods which have prevailed amongst contractors and those catering to the contracting trade must undergo a thorough revision, and the element which is most susceptible of reduction in cost is labor. To accomplish this, more careful analysis will have to be made of the work of the individual workman and the conditions under which he is performing it—call it Scientific Management or any other name you wish.

Yours very truly,
H. B. Lyall

Road Building Machinery

In road building, as in other arts, the development of new and improved machinery has been largely responsible for the progress made. While the importance of increased knowledge of materials and methods should not be underestimated it must be borne in mind that the efficient utilization of new materials and the economical application of improved methods have been made possible in many cases only through the employment of suitable machines.

Some idea of the extent to which the road builder is dependent upon machinery may be gained by considering the difficulties and, in some cases, the impossibility of carrying out modern road and pavement work without the equipment now available. Although much work could be done by hand, the results would not be as satisfactory nor would the work be done as economically and efficiently as it is under present conditions. For instance, while breaking and screening stone by hand is entirely possible, the modern crushing plant makes practicable the economical production of this material on a large scale and at prices which make it available for common use. In the same way the concrete mixer, the road roller, the asphaltic concrete mixer and the distributor for bituminous materials both cheapen operations and make possible work on a larger scale than would be feasible without such improved equipment.

During the past year inventions have been in the line of improving standard machines rather than of devising radically new ones and marked progress has been made in the manufacture of road building equipment. The development of certain apparatus used in the construction of bituminous roads, like the construction of the roads themselves, has been largely through experiment, and in the building of these various machines, again as in the building of the roads, there has been exhibited a marked tendency toward standardization. Those machines which have proved themselves adapted to the purposes for which they were designed have been further improved while those not fully meeting every requirement of their use have been abandoned and replaced by others constructed along approved lines.

Among the machines which have been considerably improved during the past year may be mentioned distributors and mixing machines. A fuller knowledge of the principles of bituminous road construction by the penetration method has led to the improvement of the machines designed for applying the material, and the growing use of the mixing method in the construction of bitumen bound roads has effected an increase in the number and in the suitability of the machines for mixing the aggregate and the binder.

In the transportation of materials from the sources of supply to the work on which they are to be used, similar advancement has been made. This includes improvements in steam and internal combustion traction engines and in cars for carrying the materials. In this connection, the development of motor-driven trucks should also be noted. These are becoming more commonly employed to replace horses and carts, and during the past year many improvements have been made in their construction.

The manufacturer of road building equipment, as well as the contractor who builds the road or the engineer who plans and supervises its construction, has a certain part to play in the development of the art. While his interest in it is, of course, to sell goods, he can do so only if his machines answer the purposes for which they are intended, and it is as much to his interest to build such machinery as it is to the contractor's interests to have it for carrying on his work. As the engineer and contractor should work together to produce the best results in the construction, so the contractor and the machinery maker need to cooperate in order to enable the latter to put on the market the most efficient and satisfactory equipment. The building of roads that will meet the demands of modern conditions is something that cannot be accomplished entirely by the efforts of any one individual or any one class, and the thing perhaps most needed at present is a spirit of cooperation among those who are engaged in the work.—Good Roads.

Tests of Roads and Road Materials by the British National Physical Laboratory

The report of the British National Physical Laboratory, which has recently been issued, contains particulars of the work carried out last year and of that to be undertaken this year in connection with the testing of roads and road materials.

In order to secure results comparable with those secured in other countries in the testing of road materials, equipment comprising the standard machines used in the U. S. Office of Public Roads was obtained. The apparatus installed consists of the following: An abrasion machine of the Deval type; a Page impact machine; a hardness machine of the Dory type; three machines for testing the cementing power of various rocks, including one ball mill for grinding material, a machine for making the briquettes and a Page impact machine for testing the briquettes; and a standard penetrometer.

The endurance tests of roads of various kinds will be carried out on a specimen road laid in the form of a circular track, on which steel wheels will be run. The track will be 2 ft. 6 in. wide and will have a mean diameter of 34 ft. The central 2 ft. of the track will be used for the tests, which will be carried out by rolling over it eight 3-ft. steel wheels, spaced at an angular distance of 45 degrees apart, and rotated by means of a 2 h.p. electric motor carried on a steel arm revolving around a center post. The radial distribution of the wheels is such that the whole surface is covered in one revolution of the arms, and to further insure uniform wear each wheel is moved rapidly backwards and formards, radially, through a distance of 1 in. The pressure of each wheel on the track can be adjusted to amounts up to one ton, and it is estimated that in the case of a tar macadam road 24 hours continuous running of the wheels at a speed of 10 miles an hour will represent the wear of one year's traffic on the typical heavily traveled road. The machine will also be available for endurance tests of rubber tired wheels up to speeds of 25 miles an hour.

A new apparatus for distributing binding material on roads adopted by the Illinois Highway Commission consists of a tank wagon, having a capacity of about 500 gallons, drawn by an ordinary steam tractor. The tank wagon, which is provided with a furnace for heating purposes, is supplied with compressed air from a pump on the tractor, and is fitted with a nozzle formed of a 2-in. pipe. The nozzle terminates with a cap having a ½-in. orifice, and inside the cap is a small cone, so that by screwing on the cap the size of the orifice may be regulated. Steam is led from the boiler of the tractor into the nozzle close to the cap by a ½-in. pipe, with the object of breaking up the binding material into fine particles or spray as it issues from the tank. The tank is filled with the binder from an auxiliary boiler by reversing the air pump, which then creates a vacuum in the tank and enables the fresh material to be sucked in through the distributing pipe.

A convict-built sand-clay road was built through slightly rolling country near Reidsville, Ga., last summer under the direction of the United States Office of Public Roads, which has given out the following records: One mile of road underlaid with sand and sandy loam was graded 30 ft. wide and surfaced 16 ft. wide with sand-clay construction, and, with 4-ft. shoulders, cost $449.15. The work was done with a road machine, plow, wagons and small tools. Two corrugated metal pipe culverts were built, one 18 in. by 22 ft. and one 15 in. by 30 ft., at a cost of $26.70 and $32.10 respectively. There were 2,060 cubic yards of clay and 810 cubic yards of sand used, the unit costs of which were as follows: Stripping the clay pits, 6.7 cents per cubic yard; loosening, 1.33 cents; loading 1.3 cents; hauling to the road, 5.5 cents; spreading, 0.31 cent; loading the sand, 0.9 cent; hauling to the road, 4.3 cents, and spreading, 0.3 cent. Further costs were: Shaping the roadbed, 30 ft. wide, $25.31; harrowing, $3.64; foreman, $49.50; guards for prisoners, $69, and clearing the right of way, $9. The total cost of this road to the community was at the rate of 4.75 cents per square yard, or $449 per mile. These figures are based on a labor cost of 30 cents per 10-hour day for prisoners, $1.30 for county teams, $3 for foreman, and $1.50 for guards. The work comprised 9,387 square yards.

Power Development at Shawinigan Falls

Energy Transmitted at 100,000 Volts over New Line to Montreal—Constructional Features of the Undertaking

THE Shawinigan Water & Power Company has just completed its second hydro-electric power development at Shawinigan Falls, with transmission lines and a sub-station at Montreal. This new power plant is located about 600 ft. from the first power house and is on the banks of the St. Maurice River, near the gorge, above which the river flows over a precipice, giving a difference between upper and lower levels of about 140 ft. This second development furnishes an interesting illustration of the progress made in hydroelectric power developments and transmission during the past ten years, as it embodies the latest improvements in the hydraulic and electric fields.

At the Falls the river drains a basin of between 17,000 and 18,000 sq. miles, and the minimum available power is estimated at about 200,000 h.p. The fall is about 140 ft., and was originally developed by a canal 100 ft. wide running from the upper reach or pool of the river to the edge of a sharp slope, down which six penstocks ran to the power house, on the bank of the lower pool. The new development makes use of the same canal, but a bulkhead has been constructed at the top of the hillside, forming a forebay. From this forebay three penstocks lead to the new power house, about 600 ft. from the old one, and provision is made for three more penstocks. In addition to this, a moveable dam is being constructed across the upper pool of the river in order to raise its level about 15 ft. This dam will consist of concrete piers with 40 x 18-ft. Stoney gates between them and a building equipped with heating apparatus built over two 16 x 18-ft. Stoney gates for regulating the excess flow of the river in cold weather. All the gates will be operated electrically and for the large ones three travelling hoists will be used, running on a track carried by the piers between the gates.

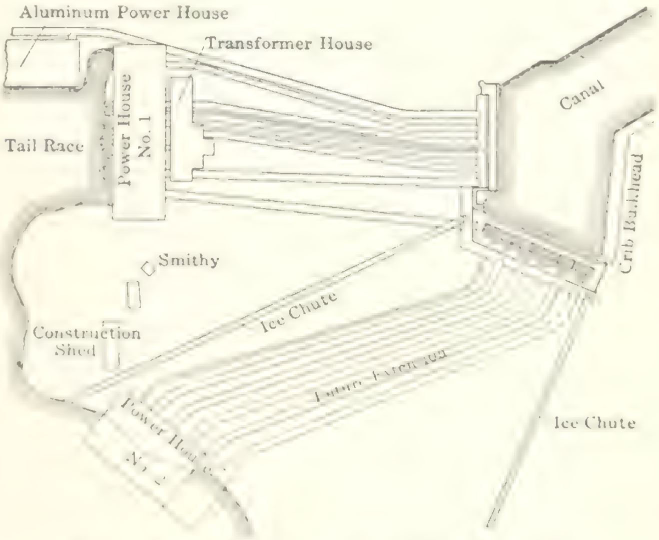
Head Works

The bulkhead is built of reinforced concrete and steel, and provision is made for five 14 ft. penstocks and one 4-ft. penstock to the exciter. The width of the bulkhead at the bottom is 60 ft., the height from the rock to the operating floor 40 ft., and the length of the structure 225 ft. Each unit of the plant is complete in itself straight through the bulkhead, penstock, turbines, generator, transformer, transmission line and step-down transformer at Montreal.

The water enters the bulkhead under a submerged arch, passes through front gates, then through racks and finally main penstock gates. Each unit in the bulkhead is separated from the other by a reinforced partition wall, forming with the front gate and main gate of the penstock an independent chamber, of a width of 27 ft. at the entrance, and decreasing toward the penstock entrance. The walls are 34 ft. high, and are designed to stand the full water pressure when the chamber is empty and the adjacent ones are full. The gates which separate the chamber from the forebay are made in three parts, one above the other, linked together, and are detachable in order to facilitate removal by a traveling crane.

The racks are constructed at an angle of 60 deg. to the horizontal, are supported by a steel frame incased in concrete, and are designed to stand a pressure equivalent to 80 per cent. of the depth of the water. The rack is divided horizontally into two parts, which are linked together and can be lifted out of the water by means of the crane. The rack is composed of bars 3½ x 5/16 in., with a clear opening between the bars of 2¼ in. The bars are fastened to a very rigid framework of channels and angles, which provides for the safe handling of the racks without any danger of bending or collapse in removing them from the chamber.

The velocity of the water passing into the chambers at the bulkhead is about 2.5 ft. per second. The velocity through the racks is 2.3 ft. and at the penstock entrance 8.5 ft. per second. The concrete walls of the chambers are nicely rounded, and an effort was made to change the velocity of the water as gradually as possible in order to prevent the usual eddies and loss of head which are present in many power developments where care is not taken in this important part of the design.



Plan of Development at Shawinigan Falls, Que.

The main headgate for the penstocks is a steel structure 13 ft. wide and 14½ ft. high, and is raised and lowered by a double-screw mechanism operated by bevel gears driven by an electric motor. The motor driving this equipment is of the direct-current series type, operating at 110 volts and provided with a standard automatic starting equipment. This starting equipment will permit the motor being started either from the gate house or from the power house by means of three buttons. By pressing one button the motor will be started and the gate raised; by pressing the second button the motor will be stopped, and by pressing the third button the motor will be started in the reverse direction and the gate lowered. Signal lamps are provided, which indicate the position of the gate when it is 1 ft. above the bottom, also the open and closed positions. Limit switches are provalves which automatically stop the motor just before the extreme position of the gates is reached.

Provisions Against Ice

The gate house building is provided with a 25-ton crane, by which means the front gates, racks and stop logs are manipulated. The design of the heating system of the gate house is somewhat novel. In the construction of the building air ducts 12 in. in diameter are provided in the floor and extending the whole length of the gate house, with laterals leading across the building. Openings are provided in the chambers so that air can be discharged in many places throughout the gate house and actually blown down against the steel work in the different chambers.

A large fan is provided in one end of the building, having a capacity of about 60,000 cu. ft. per minute, and driven by a 50 h.p. motor. The air is taken into this fan through a vertical intake, the air being taken in up toward the top of the room. In this intake are provided electric heaters, which consume about 300 kw. The air coming into the intake is heated by this arrangement, passes through the fan at a temperature of about 60 deg. C. and is blown out in many places around the gate house and especially against the top of the racks and the steel work at the side of the gates.

The mean temperature at Shawinigan Falls drops below freezing point usually early in December and, with the exception of occasional thaws, stays below freezing point until the middle of March. The minimum temperatures are reached toward the end of January and beginning of February, when there is usually experienced a continuous temperature of from 10 to 30 deg. below zero for several days. As a result of this, the formation of ice in the St. Maurice River is such that during the course of the winter about 24 in. of ice is formed, and in still, protected places the ice is found much thicker.

In the early days of the power development at Shawinigan Falls it was found that the severe weather caused very great difficulties in the operation of the gates owing to the formation of ice on the gate mechanism, etc., and it was very difficult to get the racks clear owing to the fact that the steel conveyed the heat from the water to the air, and thus the steel was very slightly lower in temperature than the water which was against it. This resulted in the formation of ice and in the sticking of floating ice to the racks, interfering with the operation of the power plant. Experience would indicate that if the steel work above the water could be maintained at a higher temperature than the water the above effects would not be so pronounced. The result of the elaborate heating system which was put in seems to have justified expectations, as there has been no ice formation inside the building and no tendency of the ice in the water to stick to the rack bars. Further, the ice has not formed around the gates, and consequently no difficulty has been experienced in operating the headgates in the most severe weather.

Penstocks

The penstocks which connect the bulkhead to the power house located on the lower level are 14 ft. in diameter and about 600 ft. long. They are carried in steel saddles placed 12 ft. apart, center to center, the saddles being supported by three concrete piers. The penstocks are made of open-hearth steel sheets varying in thickness from 3/8 to 7/8 in. at the power-house end. The 4-ft. diameter penstock is made throughout of 3/8-in. plates.

Inside the power-house, immediately in front of each water turbine and below the main floor, each penstock ends in two branches, forming the connections to the two cases of the double spiral turbines. The average velocity of the water at full load in the 14-ft. penstock is 8.5 ft. per second, and from the data which the writers have the loss in head due to bends and friction in the pipe at full load on the turbine is 1.73 ft.

Power Plant

The lay-out of the plant when completed will be such that there will be five main units provided in the power house, but the present building provides room for three units, two being at present installed. Each unit has a normal rated capacity of power delivered from the electric generator of 16,000 h.p., giving the station a total capacity of 80,000 h.p. This rating is based on a 35-deg. temperature rise of the generator, but provision is made for the generator to operate safely with 45 deg. rise of temperature, and under these conditions to deliver approximately 20 per cent. more power, so that in case of emergency the plant can be operated to give about 90,000 h.p. or 100,000 h.p. at a power factor of 85 per cent.

The general scheme of the lay-out is to divide the power station in two divisions, each consisting of two units, with the third unit in the center, which is considered as a spare and can be applied in case of trouble to either set of units. The width of the building is 115 ft., length 180 ft., and height from the bottom of foundation to roof is 112 ft.

The power house is built entirely of reinforced concrete, brick and steel. The walls inside are faced with pressed buff brick, and up from the floor to about 10 ft. with glazed enameled brick. The floor is tiled with English red quarry tiles.

All hydraulic machinery is separated from the electrical machinery in the power house by a reinforced-concrete wall 16 ft. high. The units are arranged at right angles to the long axis of the power house and are placed 40 ft. distant, center to center. The generators and turbines each have separate cranes—for the generators one of 100 tons capacity, and for the turbines one of 50 tons capacity. This double arrangement of cranes was of great advantage, as it saved considerable time in the erection of the machinery.

The main turbines are of the twin spiral-case type, receiving the water at the bottom of the case and each case discharging inward to a central draft chest. The rating of the turbine is 18,500 h.p. with an effective head of 145 ft. at 225 r.p.m. The turbines are controlled by movable guide vanes with an outside moving mechanism, operated by the governor engine through a heavy crank shaft and connecting rod. The vanes and runners are made of cast steel. Each turbine is provided with an automatic governor and governor engine, operated by water at 200 lb. pressure. The wheel can also be controlled by hand with water pressure. There is further a device provided to operate the governor engine by a small hand pump. This arrangement is considered in the nature of an emergency apparatus and is not intended to operate the gates quickly.

Each turbine is provided with relief valve located between the two spiral cases below the main floor of the power house and forming a part of the V-shaped penstock connection. The shaft operating the gates of the turbine also operates the relief valve in such a way as to provide a positive movement of this valve, so that the turbine gates cannot close suddenly without opening the valve, and when the relief valve is so opened it will gradually close at such a time as will prevent a rise of pressure in the penstock exceeding 25 per cent. of the normal pressure. The relief valve is capable of discharging at least 1000 cu. ft. of water per second, and it discharges directly into the tailrace.

Each turbine is directly coupled to a three-phase, 14,000 kv.a. generator wound for 6600 volts, 60 cycles. The rotating part of the generator weighs 198,000 lb. and the flywheel effect is 4,500,000 ib. at 1-ft. radius. Each generator can be connected either to a low-tension busbar system or directly to a three-phase, 14,000 kv.a. oil-insulated, water-cooled transformer, which raises the tension from 6600 volts to 100,000 volts.

An interesting problem which came up in connection with the construction of the power house was the handling of the steel work and machinery—in fact, everything in the power house—from the railway siding to the power house. The power house is located at an elevation about 130 ft. below elevation of the siding and about 600 ft. distant. An inclined railway between the railway siding and power house was built and equipped with a special inclined car, combined with a turntable on the top. The freight cars were run from the siding directly on this inclined car and lowered down hill by means of a steel cable operated by an electric motor. After the inclined car arrived at the lowered position the freight car was turned around by means of the turnable and pulled in the power house under the cranes for unloading. This arrangement worked very satisfactorily and provided a great economy of time and labor.

The cofferdam for the new power house was started in September, 1910, and the excavation and steel work for the foundation were carried along during the following winter. At the time of the spring flood the concrete work was well above water, that is, about 40 ft. above the rock foundation, so that the work was not interrupted. By the middle of June two cranes were erected and in operation, and on Sept. 1, 1911, the first unit, consisting of turbine and generator, was erected ready to run. The commercial operation of the power house was started Nov. 13, 1911.

Pump for Unscreened Sewage

A centrifugal pump has been invented by R. C. Parsons, the steam turbine inventor, the purpose of which is to pump sewage without first screening it. The principal features by which it is hoped to accomplish this are a knife set in the casing of the pump, combined with a thin fin, or guide, which directs the solid substances toward the impeller, and grooves in the casing by which pieces of wood, cork, etc., which may wedge between the impeller blades and casing may be caught and removed to the outlet. In other respects the general principles of the pump are the same as those of the ordinary centrifugal pump. However, the sewage enters from one side only, and the impeller blades project from a conical surface (the axis of the cone being the axis of revolution of the impeller), the forward edges of the blades also being in a conical plane. The casing is, of course, conical and fits closely to the edges of the impeller blades; which latter may be advanced toward the casing from time to time as they wear to maintain the clearance between the two at a minimum.

The fin referred to above is at the end of the inlet pipe and extends close to the impeller blades, thus directing the solid substances into the blades, by which they are carried around to the steel knife set in the casing opening, and by this cut into pieces. The passages between the blades gradually increase in width from the point where the cutting takes place to the outer circumference, by which it is calculated to prevent any substance from clogging the passages after it has once been cut up. On the inside face of the casing is a spiral groove designed to catch any small stick or other substance wedged between the impeller blades and casing, which would then be pushed by the blades along the groove to the discharge passages in the periphery of the casing.

One of these pumps was tested in England and showed a maximum pump efficiency of 51½ per cent. when making 577 revolutions per minute and lifting 1½ cubic feet per second against a head of 23.7 feet. If this pump does all which its distinguished inventor claims for it, it will be gladly welcomed by sewerage engineers and superintendents, as it will permit them to eliminate the screens and other devices necessarily employed for removing the cotton waste, shavings, rags, sticks, etc., so generally found in sewage.

Method of Depositing Concrete Under Water

The committee on masonry of the American Railway Engineering Society, during the recent convention held at Chicago, reported on methods of depositing concrete under water. The inquiries made by this committee embodied methods for depositing, depth of water and results. The following ten conclusions were submitted and adopted:

Concrete may be deposited successfully under water, if so handled as to prevent the washing of the cement from the mixture.

Cofferdams should be sufficiently tight to prevent current through the pit, and the water in the pit should be quiet.

The concrete should be deposited in place by means of a drop-bottom bucket or a tremie, and should not be allowed to fall through the water.

Where a tremie is used, it should be kept filled with concrete up to the top of the water level, and the discharge end should be kept buried in the freshly deposited mass to prevent emptying, and raised a few inches at a time as the filling progresses.

Where a bucket is used, it should be carefully lowered to the bottom and raised to the surface, so as to cause as little disturbance as possible of the water.

The surface of the concrete must be kept as nearly level as possible to avoid the formation of pockets which will retain laitance and sediment.

Where concrete is not deposited continuously, all sediment should be removed from the surface of the concrete, by pumping or otherwise before depositing fresh concrete.

The concrete should be a 1:2:4 mixture of a "quaking" consistency.

Freshly deposited concrete should not be disturbed.

In open water or where the flow of water through the pit cannot be prevented, concrete should be deposited in cloth sacks.

Embankments and Foundations—Toronto-Sudbury Branch C. P. R.*

By A. C. Oxley, S. Can. Soc. C. E.

THE Toronto-Sudbury Branch of the C. P. R. was constructed in the years 1905-1909, and as the standards were of a very high type they may contain some points of interest. No curves over four degrees were allowed, and the grades were limited to 3/10 per cent. compensated. These grades were successfully maintained, with the exception of a pusher grade of 8/10 per cent., for some miles near Tottenham mile 37. This difficulty will eventually be obviated when traffic demands it, by the substitution for freight purposes of 8 miles of 3/10 track for the present 3 miles of 8/10 per cent. Velocity grades were allowed within the limits of 10 and 30 miles per hour for freight trains.

The intention of the company was to insure a thoroughly solid road bed, rather than to keep initial expenses at a minimum, and as the greater part of its 225 miles ran through a rock and muskeg country, there was frequently some difficulty in attaining this result. This article, however, will deal only with the district between miles 22 and 182, north from West Toronto, from Bolton to Byng Inlet, as this was the part with which the writer became personally familiar during his four years' experience on the work.

The line may be divided into two sections, viz., the earth district and the rock district; the first running from mile 22 to 92, and the second north from mile 92 to mile 248.

On the south, or earth section, little difficulty was encountered either with foundations or embankments. Eventually all streams and gulleys will be bridged either by steel viaducts, or by concrete arches and embankments, but at the time a number of permanent timber trestles were built, several of them containing an average of 500,000 F. B. M. The bents of these trestles rested on piles driven to an average depth of 20 ft. or more, and the only settlement that has occurred has been on the ends of the trestles, where the bents rested on mud sills on the made embankmnt.

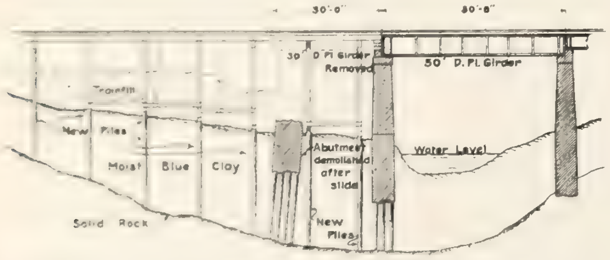


Fig. 1—Bridge abutment resting on piles demolished owing to sliding of blue clay soil during trainfilling.

A curious instance of an over refinement of engineering occurred at the Nottawasaga River trestle. The trestle is about 700 ft. long with a maximum height of 110 ft., and is located on the short tangent between two reverse curves. The trestle itself has an average elevation of 10 or 15 ft. below the general track elevation in the immediate vicinity. This is overcome by the use of 2,000 ft. of velocity grade of 6 or 7/10 per cent., resulting in a high rate of speed for the consolidated locomotive that passes over it. This will easily be remedied, however, when the trestle is replaced by a steel viaduct, either by building the viaduct higher or by slightly reducing the little summits adjacent to it. The curves also may be somewhat lessened by turning the new viaduct in a direction more nearly parallel with the tangents.

In the earth section water openings were either concrete or glazed tile pipes for small drainage areas, with concrete arches for larger ones. The pipes, on the whole, were very satisfactory, except that in a number of instances insufficient allowance had been made for their becoming reduced in area by being partially filled with water-washed sand; it was therefore necessary, under these circumstances, to replace 18 or 24-inch pipes with 4 ft. arches. The rule was to "camber" as high as the drop would allow, and the adjustment of the soil under the embankment was usually sufficient to take out quite a large curve, as "shrinkage" seemed to be due not only to the settling of the deposited embankment, but chiefly to the sagging of even firm clay in such a way as to cause a low spot in a pipe laid flat, and the consequent tendency of the pipe to clog. The culverts were the standard 1905 and 1906 types of concrete arches made in 20 ft. sections, to allow settlement. Piles were used in exceptional cases, a row under each side, but the general practice was to divert the stream far enough to secure firm soil.

Methods Adopted in Rock Section

In the rock country, practically all openings of eight feet or less were built up of the excavated rock and laid without mortar, those over four feet in width being made double, with the top constructed of flat lintel stones. These proved entirely satisfactory in the great majority of cases, as they were laid on solid rock a little to one side of the original stream.

We will now proceed to deal with the rock section, discussing particular points in the order of their mileage from the south end. At mile 102, near Buckskin, a rock embankment about 10 ft. high crossed a fairly dry muskeg, in which the rock was about 50 or 60 ft. down. No cross waying was ever permitted, as the intention was to have the rock embankment cut its way through the thin mattress of the dry surface of the muskeg; in this case the rock remained on the surface for about a year, and then gave way during train filling. Some time was spent in filling it, as its depth allowed the train gravel to move sideways, but eventually bottom was reached after 3,000 Hart car loads of gravel had been placed in it. The only real objection to its sinking, when it did, was that the gravel used was high grade surface gravel which had to be hauled about 40 miles, as track laying had not then proceeded far enough to reach the more northerly, and thus more convenient, sand pits.

The only midway divisional point was at Muskoka, mile 126 from West Toronto. As this point was in the rock district the grading for it was rather heavy, the finished yard occupying an area, apart from the main passing siding, of about 3,000 x 300 ft., much of which was solid rock that had to be lowered about ten feet. Water was obtained from the nearby Stewart Lake, but, as it is not allowable to pollute the Muskoka waters, the sewers had to drain into the swamp on the other side of the track.

The general mode of procedure through the rock country was to make the rock cut only about a third of the embankment, as this quantity of rock would have sufficient weight to cut its way vertically through the mattress, and as soon as bottom was reached the remainder could be made by train filling. The efficiency of this method of forcing the sink holes through is shown by the fact that, train filling once completed, the percentage of derailments has been at least as low on this new road bed as on that of sections twenty years old or more. This brings up an important question. If the intention is to have the weight of the rock cut its way through the mattress, and as it is only when it has done so and reached solid bottom that the earth filling becomes really effective, would it not be advisable, in some instances, before placing the rock fill, to cut right through the mattress parallel to the centre line, for instance, in the case of a thirty foot embankment, to cut two longitudinal ditches forty feet apart, and thus allow that whole section to sink vertically without deforming the surface at the side? Almost every case of deformation is caused by the sand or gravel floating sideways, and it does not become solid for some time.

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*Before the Canadian Society of Civil Engineers.

Depressed temporary grades of 3 per cent. were allowed. In many cases small hillocks of rock were cut away to allow the temporary grades to descend to the center of the larger gulleys.

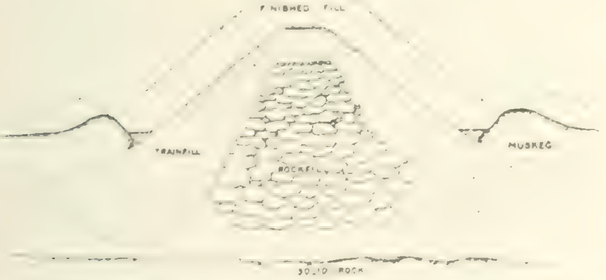


Fig. 2—Depressed grade earth and rock embankment, showing sideslip of trainfill in muskeg

At mile 124, during train filling, a low rock embankment, while carrying an engine, gave way suddenly, and the engine sank with such force as to shear the nuts in the track for a distance of 1,000 ft. or more. Between miles 112 and 142 a number of embankments were train filled from temporary trestles, and little trouble was experienced, although in many cases it was found necessary to lower the level of adjacent small lakes in order to give more solid bearing to the toes of the slopes.

At Richmond Lake, mile 101, south from Romford, the lake level was about fifty or sixty feet below the level of the track. A rock embankment rested firmly on the solid rock below, but was not carried up to grade, a trestle being used above water level. The water would probably seep through the rock fill, but, in the event of its not doing so, it would easily flow through the trestle at high water. At mile 76, south from Romford, occurred one of the heaviest train fills of the line, the depressed grade being no less than twenty-five feet at a maximum below the final grade, and as it was necessary in filling to cover the toes of a rock embankment up to thirty feet in height, at least a quarter of a million yards of earth must have been used in this one-half mile of fill.

At mile 7[illegible], south from Romford, a temporary trestle beside a lake had been train filled, but the water had apparently dissolved the embankment and caused lateral slipping. The lake was small, and the lowering of its level about four feet left the fill dry and firm.

In many instances where a comparatively dry muskeg was to be crossed, provision was made for thickening the dry supporting mattress by ditching and lowering the level of the water table. This was generally effective, provided there was solid soil in the mattress, but not invariably. At mile 70.5 from Romford, the track crossed a muskeg about two thousand feet long and from twenty to forty feet deep, with an embankment when completed about four feet high. A drainage ditch was dug, leaving the water table only about four feet below the level of the surface soil. The track crept very badly and made "sun kinks," elevations taken during the passage of a train showing track undulations of one or two-tenths. The track was made safe for traffic and prevented from creeping by the substitution of 14-ft. bridge ties; later it was diverted to a side hill of solid rock and made thoroughly solid.

At mile 66.7, south, in order to make secure a muskeg, which for its length gave considerable trouble, a depressed grade was built, with a rock embankment about 10 ft. high, the lowest point of which was a maximum of about 20 ft. below the intended finished grade. In this case, although soundings showed a depth of 50 ft. or more to bed rock, the weight of the rock embankment was not in itself sufficient to slice through the surface mattress. This was somewhat unfortunate, as it was always found that although earth alone would eventually reach a firm foundation, yet, owing to its specific gravity being so low, it had a great tendency when placed by train filling, to move horizontally rather than vertically, causing the mattress to bulge upwards for some distance out from the toes of the slope.

The writer was not present until the completion of the filling of this sink hole, but although it had a length of only 600 ft. and had to be lifted to a height of 20 ft. above the depressed grade, a fill of 30,000 yards had raised it only 3 ft. Fortunately, by the use of spreaders, the embankment while sinking retained a good surface and alignment, and no difficulty was experienced in running passenger trains over this temporary velocity grade.

The next large fill occurred at the crossing of the Magnetawan River, the valley of which was about 3,000 ft. wide. With the exception of three girder spans this valley was crossed by a timber trestle about 40 ft. high. In this case the length of the trestle helped to reduce the unit cost of filling, as it was possible to fill from temporary grades placed on each side of the trestle, and thus leave the main line open for traffic.

Bridge Work

It might now be interesting to mention a few of the bridges, with reference to foundations. On this 160 mile section, with two exceptions, there were no steel bridges larger than plate girders; the exceptions were at the Severn River, where there was a 200 ft. through Pratt Truss, and at Parry Sound, where there was a viaduct 1,700 ft. in length. The largest span consisted of two Howe Deck Trusses of 165 ft. span. In the earth district all concrete was carried below frost line and rested on piles; while in the rock country the piers in almost every case rested directly on the rock itself.

During the construction of the Parry Sound Viaduct a simple method was adopted to eliminate delay. The track was paralleled at the points by the C.N.O. Ry., and running rights, or rather haulage rights, were given by that railway over a four mile section through Parry Sound. In this way it was possible to lay some twenty miles of steel north of the Sound during the construction of the viaduct, at the same time leaving the bridge contractors a mile or more of blind main line for bridge yard purposes. The only difficulty occurred at one of the abutments at the South Nascontyong River. In this case the abutment was carried to a depth of 10 or 15 ft. below the surface of the ground, and piles were then driven to bed rock, about 20 ft. further. Back of the abutment was a temporary trestle about 30 ft. high resting on mud sills, the soil being an alluvial clay which was kept moist by the presence of a stream less than 100 ft. away. No trouble was experienced with the abutment until train filling had proceeded for some time on the temporary trestle, when the earth filling caused a flow of the clay sub-soil, and although the bases of the piles remained in their places on bed rock, the flowing of the clay caused the abutment to tilt forwards, necessitating its demolishment. No further attempt was then made to fill the embankment, but piles were driven and a trestle constructed, both in place of the temporary trestle, and also between the abutment and the next pier, the new trestle replacing a short girder span.

In this case, even if the pier had been constructed just as it was, had piles for the temporary trestle been driven at once, the clay might possibly have been so firmly anchored that there would have been little, if any, horizontal movement.

The Weight and Expansion of Excavated Earth

From a Contractor's Notebook

On the weight of earth there is a lack of definite information. Many of the figures in sight are for more or less loose earth, with no information as to how the material is handled or measured, and in other cases the weight is given without a hint as to whether the figures apply to earth in the pit, or after excavation.

Many experiments are needed before the last word can be said on the different kinds of earth under different conditions—in the pit, freshly cast out, shoveled into barrows, cast into wagons, dry, damp, wet, etc. The witness seems to have much to do with it. Twenty per cent. of water added to an earth which when "dry" weighs 3,200 pounds per cubic yard raises the weight to 3,800 pounds, and it seems probable that the voids in "dry" earth in place, especially in soil near the surface, will often admit of the addition of more than 20 per cent (by weight) of water.

The following notes are taken from the original records of some tests made by the writer with pits of twenty cubic feet:

In twelve cases we got 2,994 to 3,330 pounds per cubic yard "in place," with an average of 3,186 pounds for earths which were called "dry" or "damp," and were thought to belong in classes No. 1, No. 2 and No. 3. No. 1 earth was not obviously the lightest, and No. 3 the heaviest of these, and it is suspected that while there may be such a relation it will be obscured by small differences in the percentages of moisture until experiments more scientific take note of that factor.

One case gave 3,522 pounds per cubic yard for a "dry" earth, which consisted of sharp gravel with about out-third cobble and some clay.

In two cases the weight per yard was 3,726 and 3,761 pounds. The material here was mostly a dense mixture of red clay and gravel, plastic and moist-to-saturated. The ground water was close to the surface.

In twelve cases the earth, as fast as picked, was shoveled—rather gently, perhaps, into a 4 cubic foot box on platform scales alongside, showing expansions, when so handled, of 46 per cent. to 69 per cent., average 56¾ per cent.

In one case "soft rotten rock" picked and cast out of a trench 5 feet wide by 2½ feet deep by 16 feet 2 inches long, and reshoveled into carefully measured, straight-sided struck barrows holding 3.4 cubic feet each, showed 54.8 per cent. expansion. No weights were taken.

In four cases earth from 20 cubic feet pits was, after picking, cast 5 or 6 feet, as if into a wagon, into a box 3 feet wide by 2 feet deep by 5 feet long, leveled and measured, showing expansions 31 to 37 per cent., average 34 per cent. These pits were alongside of four others previously mentioned, in which the expansions in the 4-foot box were 46 to 56 per cent., average 51¾ per cent.

Summary

In the light of the foregoing, the following tentative approximations can be drawn for ordinary earth, "dry" or "damp" (from which perhaps 5 per cent. or 10 per cent. could be stove-dried—it is probably never quite dry in the pit), picked and shoveled by hand, no distinction being made between earths of the different classes:

	Weight per cu. yd., lb.	Expansions	Pit meas. in per cent of loose meas
In place, pit measure	3,200*		
Freshly loaded in wheelbarrows	2,100	50%†	66%
Freshly loaded in wagons.. ..	2,400	33%	75%
Freshly loaded in 3 or 4-yd. car	2,500	30%‡	80%

*It is thought the same earth "wet" may weigh 10 to 20 per cent. more, and that even a "dry" earth containing many cobbles may reach 3,600 to 3,700 pounds.

†Expansion put at only 50 per cent. because the 4-foot box of the tests was loaded rather gently; but the large size of the box, in comparison with a barrow, would partly correct the results. Earth spaded and cast in clods will expand more, when measured in barrow or bucket. When part of it was so handled, pit measure was found to be only 63.4 per cent. of the water measure of heaped 5-foot buckets—on a record of 9,000 trains of six buckets each.

‡This is for hand loaded cars. When small cars are loaded by steam shovel . . . . another story.

In view of the ancient error surviving in the books unto this day, it is hoped someone may be led to dig for definite information on a yard of earth. Experimenters should determine the percentage of water in their specimens, say by stove-drying 50 lbs. and reweighing, and should describe the earth so that those familiar with the art may recognize it. Parallel tests should be made loading into boxes of barrow size (say 3 cubic feet), casting into wagon beds (of say 30 cubic feet, etc.—Engineering News.

Is There Such a Man?

(Toronto's Quest for a City Engineer)

"Mr. Rust's successor must be a man of unquestioned standing in his profession. He must also possess executive ability and the faculty of inspiring a spirit of loyalty among his subordinates. In addition to these things, he must be able not only to handle the public, but to deal with an often unreasonable governing body in such a way as to secure for Toronto what Toronto most needs. He must have tact as well as determination. And above all things, he must be equipped with boundless energy, a progressive spirit, and a genuine capacity for hard work."—Toronto Star.

Operating Small Sewage Disposal Plants

Data from U. S. Cities of less than Ten Thousand Population—Work Required for Maintenance and Annual Cost

INTERESTING information relating to the oversight required in the operation of small sewage disposal plants in the United States, together with the cost thereof in a number of cases, is given by the Municipal Journal. The following questions were asked concerning each plant:

1. What population contributes sewage to the plant?
2. What are the average, maximum and minimum rates of flow to the plant?
3. What kind of purification plant is used?
4. Describe in general the work required in maintaining and operating the plant.
5. Who is in responsible charge of it?
6. How many do actual work at the plant, and for how many hours per week?
7. What was the cost of maintenance during the fiscal year?

Because the answers to the various questions are so interrelated, and many of the replies were given in the form of a general letter, it does not seem best to endeavor to tabulate the answers, or to classify them in any way, except, possibly, according to a geological arrangement. The information returned by the engineers and superintendents addressed is given below.

In Concord, Mass., population about 2,000, the average amount of sewage treated during 1911 was 274,000 gallons a day, the maximum about 500,000 and the minimum about 190,000. Intermittent filtration is used, the plant comprising four filter beds with a combined net area of 3.3 acres; and beds being used in rotation. The sewage flows first into a storage reservoir with a capacity of 300,000 gallons, which is situated near the municipal power station, and from four successive days in summer to seven days in winter; after which the gates are changed and the next bed in rotation is used.

Maintaining and operating the plant requires attention to the pumps, which are located in the power station and are looked after by the regular employees of the power station; the cleaning of the screen chamber, which requires about eight hours' labor once in two weeks, and finally the removal of sludge from the beds in the spring, levelling the ridges with a harrow and smoothing up the beds with rakes and removing from the surface of the beds any dried sludge and weeds, as occasion requires through the summer. About the middle of November the beds are thoroughly cleaned and furrowed with diagonal and side distribution channels, which has resulted in more or less sludge becoming mixed with the upper portion of the sand during the twelve years the beds have been in use, so that now a considerable part of the maintenance work during June, July and August is in keeping the weeds down. This work is under the responsible charge of the superintendent of the Water and Sewer Department, the actual work being done by from one to six men, averaging about 54 hours per week for eight months of the year. The cost of maintenance of these beds during 1911 was $445, or about 22 cents per capita. The total cost of pumping the sewage was $1,363.90 and the total maintenance cost of the sewerage system, not including interest and sinking fund payments, was $3,351.16. For this information we are indebted to Leonard C. Robinson, superintendent.

Gardner, Mass., has a population of about 10,600 and a water consumption of 650,000 gallons per day, which amount is believed by Geo. N. Dyer, chairman of the Sewer Commission, to be practically that of the sewage also. The sewage is treated by passing it through four settling tanks and from these to sand filter beds. One settling tank is emptied of the accumulated sludge each month. The filter beds are cleaned three or four times a season, and late in the fall are hilled up as in the case of Concord. This work is under charge of the Sewer Commission, Geo. H. Howard being the foreman of the disposal plant. Two men are kept on the plant the year around, and in the summer from six to twelve additional men are used as the work requires. The cost of maintenance during the last fiscal year was $2,914.61, an average of 27½ cents per capita.

Lakewood, O., has a population contributing to the sewage of about 13,000. The average rate of flow during 1911 was 811,000 gallons, the maximum 1,045,000 and the minimum 595,000. (These figures are believed to be approximately correct). The plant consists of septic tanks and contact filter beds, the operation of which is largely automatic and requires very little oversight. The plant is in charge of the director of public service, and one man devotes about 18 hours per week to looking after it. No record has been kept of the exact cost of maintenance.

Oberlin, O., has a permanent population of about 3,500, to which is added about 2,000 students during the college year. The normal flow is about 200,000 gallons, the minimum night flow about 25,000 gallons and the maximum flow due to storm water 1,500,000 gallons. During storms the plant is by-passed and storage reservoirs are used for settling the sewage. The treatment consists of a settling tank, with further treatment in a contact bed and on a sand filter. The work required in maintaining the plant comprises drawing off the sludge from the settling tank, cleaning the grips on the contact bed and raking the sand bed. The plant is in charge of the village engineer. The cost of maintenance cannot be given, as the work is done by men regularly employed on other village work.

Westerville, O., has a population of about 1,500. No figures could be obtained of the average, maximum or minimum rate of flow to the plant, which consists of a filter bed of cinders. One man puts in about 25 hours a week in looking after the plant. The cost of maintenance could not be ascertained.

Bloomington, Ind., has a population of about 5,000. The amount of flow to the plant could not be given, but City Engineer U. S. Hanna states that it is carried by a 12-inch pressure line flowing under an average head of 18 inches, varying from 12 inches to 24 inches. The purification plant consists of a tank surrounded by contact beds, sprinkling filters and settling basins. During the three years of its operation scarcely any work has been required at the plant. The opintendent of sewers (who is also street commissioner) is in responsible charge of the plant, and visits it once a week.

At Highland Park, Ill., there are seven purification plants, each serving a separate sewer district. The population served is about 5,000. In four cases the plant consists merely of a settling tank, these treating the sewage from populations of 1,300, 1,100 and 1,500 and 600 respectively. The costs of constructing these tanks were $3,000 for each of the first two, $3,500 for the third and $600 for the fourth. One plant, receiving the sewage from a population of 60, consists of a settling tank and filter and cost $500; another, similar plant receives the sewage from a population of 300 and cost $10,500. The seventh plant receives the sewage from 50 and consists of an Imhoff tank costing $1,500. These are all inspected once a month, and the only maintenance required is cleaning the tanks. The commissioner of public works, J. C. Shields, is in responsible charge of the plant, which is working very well and has given no trouble except that the first mentioned settling tank blew up three years ago, following which some changes were made in its construction.

Concerning Jerseyville, Ill., City Engineer E. B. Shafer states that the sewage passes through a septic tank, from which it is discharged directly into large natural ditches. Nothing was spent for maintenance of this plant last year.

Paris, Ill., population 5,000, passes its sewage through a septic tank. City Engineer C. P. Lycan states that $30 a year is spent in the maintenance of it.

Wheaton, Ill., maintains a septic tank which receives the sewage from about 3,000 people. The amount of flow is not known, but A. L. Webster, county surveyor, states that it is carried through a sewer 15 inches in diameter, not more than 20 per cent. of the area of which is occupied by the sewage. "When installed, this plant was recommended as requiring no attention, and for a period of five or six years was neglected. The effluent, however, became objectionable to parties below and adjacent to the tank, which was in the vicinity of the Chicago Golf Club and close to some of the summer residences of those who patronized the club, all of whom demanded that the condition be relieved. Since 1910 several attempts have been made to clean the tank and place it in better condition, and the open ditch outlet which had been in existence some twenty years was dredged for a distance of four miles in order to provide a better current. Last fall and winter the plant was given a thorough cleaning and is now probably in as good condition as when first installed. Somewhere in the neighborhood of $500 was expended in cleaning the tank." The plant is in charge of the committee on sewers and drains. As stated, nothing was spent in maintenance for several years. It is probable that the tank will either be removed to a distance from those who might object to it, or else will be remodelled and filter beds added.

Holland, Mich., with a population of 12,000 or more, several years ago built a septic tank and coke strainer for treating its sewage, but we are informed that the plant has been out of working order for a long time.

In Jackson, Mich., a septic tank receives sewage, neither the amount of which nor the population contributing to it could be given us by the city engineer. The tank is in responsible charge of the superintendent of public works, and its maintenance receives a part of the time of one man.

Fond du Lac, Wis., used septic tanks and filter beds some years ago, but they "have not been in use for a number of years on account of litigation."

Ripon, Wis., has a population of about 4,000, of which about 40 per cent. are using the sewer. The minimum flow is given as about 15,000 cubic inches per minute (93,500 gallons a day) and the maximum as 20,000 cubic inches per minute (125,242 gallons a day). Three filter beds are used, each of which receives the sewage for from ten to fifteen successive days, depending upon the temperature. In a screen house is a settling tank and a coarse screen. The maintenance consists of cleaning the beds and the screen, the former after each period of use and the latter from two to four times each 24 hours. The settling tank is flushed out twice each week, the sludge being carried to a small bed, from which it is raked up when dried. In addition, sand is replaced which has been removed from the filters with the sludge, the grass along the borders of the beds is kept trimmed, and these and minor matters keep a caretaker busy most of the time. The plant is in charge of the Board of Public Works, and one man does all the actual labor at the plant, except for about 30 days in the early spring when the beds are being put into condition after the winter, during which season it is impossible to clean them. The chairman of the Board of Public Works, O. C. Stickle, to whom we are indebted for this information, states that the total cost of maintenance during 1911 was $450.48 in cash, to which should be added $6 per month for the rent of the house which the city owns. This gives a total maintenance cost of $522.48, or about 32½ cents per capita for the contributing population. "The plant is working fairly well, and with proper care will take care of our sewage for many more years."

The report of the Ohio State Board of Health for the year 1907 contains a number of figures of operation costs of plants in that State, from which the following figures have been tabulated:

Place.	Number tributary to plant.	Treatment.	Character of effluent.	Operating exp.	
				Total.	Per person tributary.
Alliance	6,500	Chemical precipitation	Putrescible	$3,600	$0.55
Ashland	3,000	Septic tanks; sand filters.	Good	393	.13
Canton	23,500	Chemical precipitation.	Putrescible	3,200	.14
Clyde	1,050	Sludge boxes; sand filters	Good	120	.12
Delaware	4,000	Septic tanks; contact beds	Putrescible	.....	...
East Cleveland	7,000	Septic tanks; strainers; sand, coke and broken stone filter	Fair.	6,277	.90
Fostoria	5,000	Sand filters; sand trenches and land treatment	Good	1,216	.24
Geneva	1,200	Septic tanks; sand filters.	Good	700	.58
Glenville	6,500	Chemical precipitation; strainers; sand filters	Poor	3,858	.59
Kenton	400	Septic tanks; strainers; coke and stone filters	Fair	106	.26
Lakewood	7,000	Septic tanks; contact beds	Good	284	.04
London	500	Septic tanks; contact beds	Good	.....	...
Mansfield	12,000	Septic tanks; contact beds	Good	5,260	.44
Marion	8,000	Septic tanks; contact beds; sand and fine stone filters	Good	1,224	.15
Oberlin	3,400	Sludge pits; land treatment	Fair	700	.21
Plain City	725	Septic tanks; sludge pits; contact beds	Good	199	.27
Shelby	1,600	Reservoirs: cinder filters.	Good	600	.37
Westerville.	300	Septic tanks; contact beds; cinder filter	Fair	.....	...
Xenia	.....	Sludge pits; gravel filters	Putrescible	.....	...

Tests of Reinforced Concrete Beams

Details of tests of plain reinforced concrete beams, made by the U. S. Bureau of Standards, are given in a "technologic paper" just published. The tests comprise simultaneous compression tests on 8 x 16-in. cylinders and 6-in. cubes and simply reinforced beams with varying percentages of reinforcement. The series consisted of 336 beams (three of which were not tested) together with the corresponding cylindrical and cubical test pieces for compression tests and 48 bond test pieces to determine the adhesive strength of the aggregates used. Representative material of four classes of aggregate, gravel, crushed granite, crushed limestone and cinders, were used in making up the test pieces which were tested in triplicate at the ages of 4, 13, 26 and 52 weeks, respectively. The report says:

> The report of these tests has been confined exclusively to a presentation of test data in such a way as to indicate with considerable certainty the various elements which affect the design of architectural and engineering structures. Studies have, therefore, been made near maximum load between external load conditions, as measured by the bending moment, and resistance of the beam as determined by the resisting moment. There is included the relation between the unit stress at maximum load and the yield point of the reinforcement.
>
> Studies have been made for maximum load and for unit stresses of 16,000 and 32,000 lb. of the relation between the effective percentage of reinforcement and (1) the resistance of the beam as measured by $\frac{M}{bd^2}$, (2) percentage depth to the neutral axis, (3) unit compressive stress in the extreme upper fibre, (4) the deflection at the centre of the beam. The results are presented diagrammatically and in greater detail in tabular form. The change of such relation with age and the difference due to the nature of the aggregate have also been determined and are presented.
>
> The development and spacing of the tension cracks below the neutral axis for the various aggregates, ages, and percentages of reinforcement is plainly shown by photographs of the beams.
>
> There is also included a study of plain concrete in direct compression. The growth in strength with age and the increase in stiffness as measured by the initial modulus of elasticity, are clearly brought out. The variation with age of the ratio of the yield point to the ultimate strength for the different aggregates has been determined.
>
> No extended discussion of the theory of reinforced concrete is attempted in this bulletin, and theoretic formulas have been introduced only where necessary for the intelligent presentation of the data. The formulas used are, however, not original with the bulletin, but are based on assumption which are thought to approximate the truth.

The preliminary description includes accounts of the methods of tests of the cement, the sand, the aggregates, the reinforcement and the separate test pieces. Following that is a chapter on the result of tests, which discusses the tables which include all the data of the tests and in addition takes up the analysis of the beam at the first crack, the analysis at maximum load and the effect of variations in the percentage of reinforcement. Finally, in this portion is a discussion of the compression tests, taking up the influence of age on relative strength of cubes and cylinders and upon the modulus of elasticity and yield point and the ratio of the yield point to the ultimate strength.

The variation in the constants entering into the composition of the beam and the completeness of the record of the tests are such that a great number of tables and diagrams are needed to present the results. At the same time, these results are most comprehensive and permit of a thorough study of the behavior of simple reinforced-concrete beams.

Conclusions

As a result of the tests, the authors have made the following conclusions:

> **Reinforced Concrete in Flexure**—The unit elongation of the extreme lower fibre at the time of the occurrence of the first crack is 0.00012, for stone and gravel concrete, 0.00018 for cinder concrete, and equals the unit elongation of the lower fibre at rupture of a beam of the same concrete without reinforcement.
>
> The unit elongation of the extreme lower fibre at time of the occurrence of the first visible crack increases with the percentage of reinforcement.
>
> The distance between cracks due to tension varies with the percentage of the reinforcement, slightly with the kind of aggregate, and is independent of the age of the concrete.
>
> The ratio of the unit stress in the reinforcement at maximum load to the yield point varies with the percentage of the reinforcement, is independent of the age of the concrete, and shows no regular variation with the initial modulus of elasticity of the concrete.
>
> The unit bond stress at a load just below maximum, for a unit stress in the reinforcement somewhat less than the yield point, is almost constant and equal to about 120 lb. per sq. in. It increases slightly as the percentage of the reinforcement increases, increases somewhat with age, and with the strength of the concrete.
>
> Basing the resisting moment of a reinforced-concrete beam on the tensile stress in the reinforcement, and neglecting the tensile resistance of the concrete, the ratio of the resisting moment to the bending moment is always less than one between 0.5 per cent. and 1.7 per cent. "effective" reinforcement. This ratio is independent of the kind of aggregate used, decreases with age, and increases with the percentage of reinforcement.
>
> The behavior of a reinforced-concrete beam, having the reinforcement in two horizontal planes is identical with a beam having all the reinforcement concentrated in one plane, and equal in amount to the reinforcement in the lower plane plus that in the upper plane multiplied by the ratio of the distances of the upper and lower planes from the neutral axis.
>
> The percentage depth of the neutral axis below the top of the beam increases with the percentage of reinforcement and increases or decreases with different amounts of reinforcement as the intensity of loading increases, depending upon the ultimate strength of the concrete as influencing a compression failure, and the relative stiffness of the concrete for varying degrees of stress as determined by the character of the stress deformation diagram of the cylinders (fixed by the proportions, consistency, kind and age of concrete).
>
> For all practical purposes the percentage depth to the neutral axis for a given unit stress in the reinforcement may be taken as independent of the age of the concrete.
>
> The character of the concrete as measured by its modulus of elasticity exerts an influence on the position of the neutral axis.
>
> For any given percentage of effective reinforcement the moment of resistance varies as the ordinates of a straight line, and based on the moment of resistance of a plain con-

[illegible] the moment of resistance for a reinforced concrete beam is proportional to the effective percentage of reinforcement.

The moment of resistance is appreciably affected by the character of the aggregate used and the age of the concrete.

For a given unit stress in the reinforcement the deflection increases with the percentage of "effective" reinforcement and increases as the modulus of elasticity and ultimate strength of the concrete decreases.

The deflection of a reinforced concrete beam increases in direct proportion to the increase in the unit stress in the reinforcement.

The unit compressive stress in the extreme upper fibre varies with the percentage of effective reinforcement as the ordinates to a straight line.

Excepting cinder concrete for the earlier stages and low percentages of effective reinforcement, the unit stress of 16,000 lb. pr sq. in. in the reinforcement corresponds to a unit compressive stress in the extreme upper fibre of at least 1000 lb. per sq. in.

Concrete in Compression—The conclusions as to the general effect of age on the various elements (ultimate strength, initial modulus of elasticity, and yield point) that determine the value of a given concrete are probably of fairly general application.

It should be recognized that the results obtained for each class of material—i.e., granites, limestones, gravels, etc.—used in these tests may not be applicable to other materials of the same class obtained from a different source. There are too many elements affecting the strength of concrete to warrant the assertion that because an individual of a class—i.e., granite—gives excellent results, that, therefore, all granites will give equally good results. The gravel used in these tests had smooth round surfaces but developed a compressive strength but little inferior to that of the granite, and appreciably greater than that of the limestone. Yet it cannot be stated that the use of any given gravel for concrete is permissible, because this particular sample, which originated from a hard, flinty rock and is well graded, gives excellent results. A gravel deposit will necessarily partake of the physical properties of the rock from which it is derived and no good results can be hoped for by the use of a gravel which originated from a soft, chalky limestone or from some weak, cleavable shale or sandstone. The compressive strength of the stone affects the compressive strength of the concrete in which it is used in too great a degree to warrant the neglect of the consideration of this influence, while even for the same stone, the strength of the concrete will be greatly influenced by the uniformity or nonuniformity of the grading.

Again, for equally good grading, the material which grades down from the larger particles will nearly always show the greater strength. The effect of a large amount of dust in decreasing the strength of the concrete should not be overlooked. It must be recognized that the quality of the sand used in making the concrete—i.e., its hardness, size and grading, the presence of a large amount of very fine material—are all elements which will modify conclusions as to the excellence of a given stone or gravel.

From a consideration of the above facts it is always advisable to make careful investigation of the materials available, even though the costs of tests seem excessive.

The weight per cubic foot for a 1:2:4 stone and gravel concrete may be taken as 150 lb. and a cinder concrete 120 lb.

The ultimate strength of 2000 lb. per sq. in. for a 1:2:4 concrete at the age of four weeks, was exceeded by almost 50 per cent. for the granite and gravel and by 25 per cent. for the limestone concrete, but the value found was 20 per cent. less than 2000 lb. per sq. in. for the cinder concrete.

The ultimate compressive strength of concrete shows a substantial increase from an age of four to one of 52 weeks, the strength at four weeks being about 65 per cent. of that of 52 weeks.

The yield point at the age of four weeks averages about 0.30 the ultimate strength and for stone and gravel concretes is well above 500 lb. per sq. in., but for cinders is somewhat less. The yield point shows a substantial increase with age.

The compressive stress, gross deformation diagram of concrete may be represented by a straight line up to a unit stress 1.5 times the yield point with a maximum error of about 6.5 per cent. A working formula for reinforced-concrete in flexure, based on a constant stress deformation diagram for concrete in compression, will, therefore, give correct results up to an extreme unit fibre stress of 0.30, the ultimate strength. This would correspond to a factor of safety of about 3 and for a unit fibre stress 50 per cent. greater the error will not exceed 7 per cent.

The initial modulus of elasticity at the age of four weeks exceeds 2,500,000, the amount usually specified, by about 85 per cent. for gravel, 70 per cent. for granite, and 45 per cent. for limestone concrete, but is 35 per cent. less for cinder concrete.

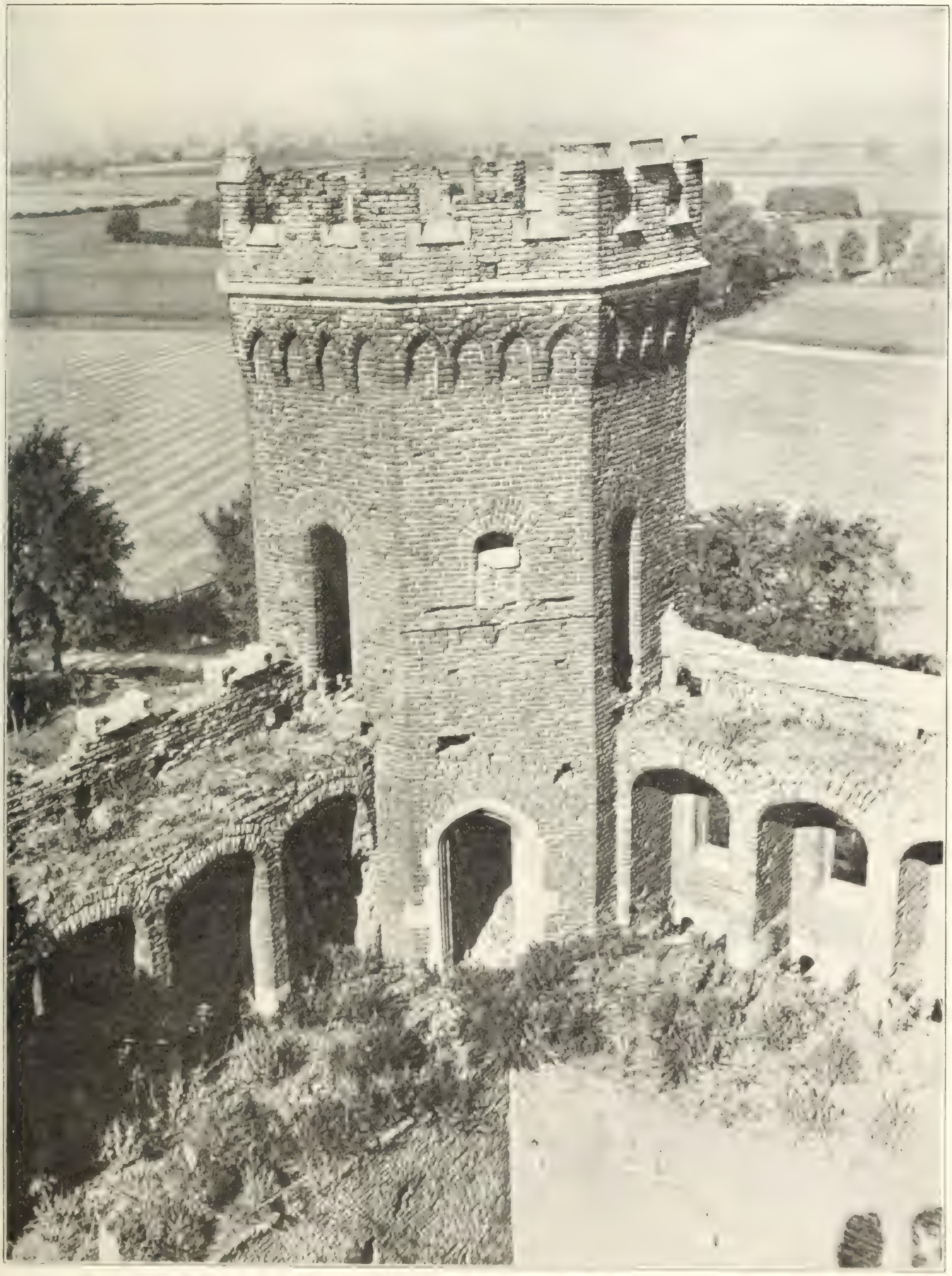
The ultimate strength of concrete in compression as given by the cylinder test is always less than that given by the cube test, the ratio being about 75 per cent. at the age of four weeks, and showing a substantial increase with age, due to the greater percentage increase of strength for the cylinders.

Reinforcement—A study of the 1260 tests of the steel used as reinforcement for the beams herein recorded shows that: (a) For even practically identical ultimate strengths there is considerable variation in the percentage of elongation and reduction of area. (b) The yield point bears no relation to the ultimate strength.

Brick Tower, Five Centuries Old

The view shown on the opposite page is reproduced from a photograph of one of the towers of the famous Tattershalls Castle, Lincolnshire, Eng., which was built in 1443 by Ralph Cromwell, Lord Treasurer of England. Announcement is made that this castle has been purchased by Wm. Randolph Hearst, the millionaire newspaper publisher of New York City, who, it is said, will remove it to a site facing Long Island Sound, where it will be re-erected. We are indebted to Brick & Clay Record, of Chicago, for the illustration.

Strengthening an undermined bridge pier was done by dumping rock around it and then filling in with concrete, deposited through the water, at the crossing of the Alabama River by the Louisville & Nashville Railroad near Montgomery, Ala. When it was discovered that one of the spans had moved slightly, an examination was made by divers, which showed that the material had washed out to a depth of 8 or 9 ft. at one side of the round draw-span pier. The water in the river was 12 to 14 ft. deep at low stage, with some current. Between 30 and 40 carloads of stones of ½ to 1 cu. yd. size were placed around the pier, but 5 or 6 ft. clear of it, and up to 2 or 3 ft. from the surface of the water. Concrete was then lowered in steel drop-bottom buckets, 3 ft. square, and deposited between the stone and the pier until 80 to 100 cu. yd. was in place. This plan caused the concrete to run under the foundation and to restore the pier to a solid bearing.



One of the brick towers of Tattershalls Castle in Lincolnshire, Eng., which has withstood the ravages of time and tempest for nearly five centuries.

The Ornamental Possibilities of Brick

Examples of Color-Lining, Raised and Sunk Work—Pleasing Variations by which Artistic Merit is Obtainable

By W. C. Kerby

ONE of the most beautiful and natural reliefs in connection with brick ornamentation—far more so than the aimless introduction of stone in a violent contrast of conflicting color—is that of lining. Judiciously arranged, either in different colors—such as a grey with stocks—red, or the various tones of brown-colored bricks, stocks with browns, reds, etc., far better results may be obtained than by the introduction of a foreign and unnecessary element in brick-building. If carefully arranged with the more subtle toning distinctions of various tints of brown, red, etc., the pattern being picked out also in a lighter or darker tone of the same color, with sometimes a slight relief of grey, a far higher grade of real artistic merit is obtainable, producing at once a more refined and subdued composition, quite lacking any of those inharmonious notes caused by more violent contrasts; such as, for instance, a vivid red of startling brilliancy combined with the brightest of yellow stocks. Some knowledge or taste regarding color is doubtless required, even for fairly successful work in these materials, to say nothing of obtaining the best results possible. At the same time, a far higher grade of work might be produced in this branch of architectural art in general by the use of a little discrimination and bearing the above hints in mind. Simple lining effects in color may be readily obtained, and that really without the slightest extra expense, simply by picking out the bands or patterns in the natural bonding by either of the above-mentioned methods. Several such designs are illustrated by Figs. 1, 2, 3 and 4. Simpler lining patterns can be easily formed, if desired, merely composed of two or three lines, which will no doubt be readily enough grasped from the first four illustrations without separate figures. It should be specially noted that this style of work does not interfere with the bond, or involve cutting, in any way. Coming to a slightly more advanced stage by the introduction of diaper patterns, a little more care is possibly required in the setting, as shown by Fig. 5, 6, 7, 8, and 9. Another stage in brick ornamentation is that of alternated composite patterns, illustrated by Fig. 10. Such work can be used to advantage either continuously in frieze decoration, etc., or simply as a pattern-piece, as shown, forming a centre to a gable or some other prominent feature which would otherwise present a monotonous blank space. Fig. 11 illustrates another simple composition. These patterns, however, invariably look far better paired and linked up with broken lines in a simpler manner to that shown by Fig. 9. In illustrations 12, 13, and 14, various patterns of double chainwork are shown. Lighter and narrower banding by this method, to meet various requirements, can be formed by means of a single chain alone. This point should be noticed from the latter illustrations without separate ones. Exceedingly good combination effects may be obtained by the judicious arrangement of color relief-bands with raised and sunk work, a simple pattern in this style being illustrated by Fig. 15, the

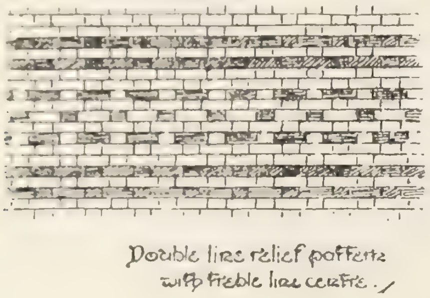


Fig. 1

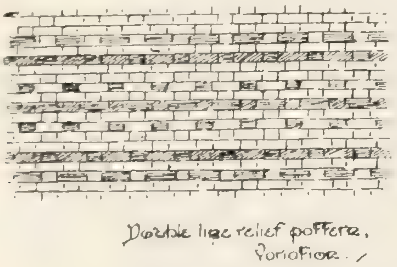


Fig. 2

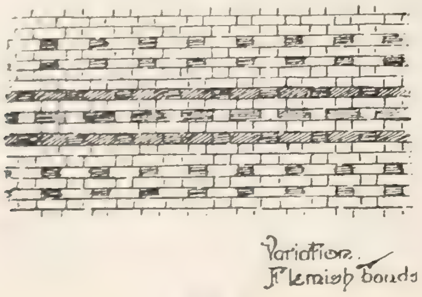


Fig. 3

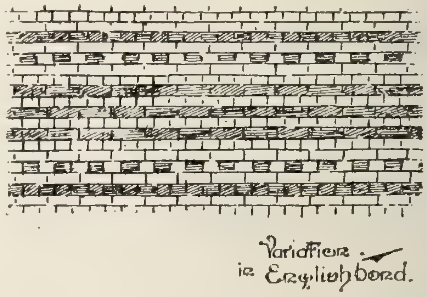


Fig. 4

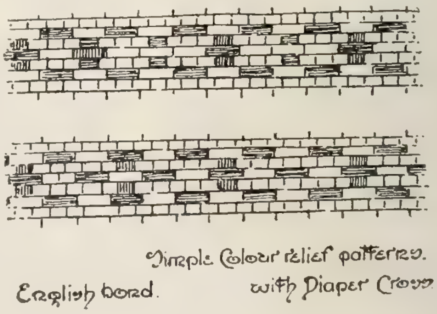


Fig. 5

variation of effects obtained in the same pattern with the two different methods being here shown. Composite patterns, again, in raised and sunk work, are capable of really beautiful results when carefully studied with regard to correct relief, composition, and color effects combined, as shown by the illustrations Nos. 16, 17, and 18. Regarding the two latter figures, it is well to note the value given to the composite patterns by the wider spacing as compared with the previous and other figures. With this style of ornament, the same as in any other, too much repetition of closely-set patterns merely tends to over-elaboration and equality of ornament—a result which is often as bad as, where not far worse than, no ornament at all. Carefully-set composite patterns, with the requisite blank spacing between, slightly connected up with toned, raised, or sunk bricks, in broken line, produce by far the best results, as seen. Fig. 19 illustrates a single and elongated chain pattern picked out in solid color with recessed panels, producing another slightly varied effect.

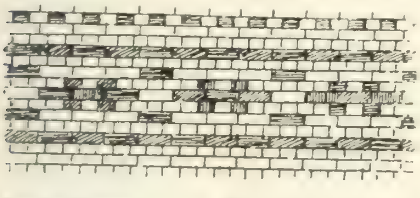


Fig. 6

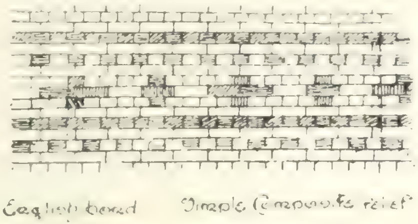


Fig. 7

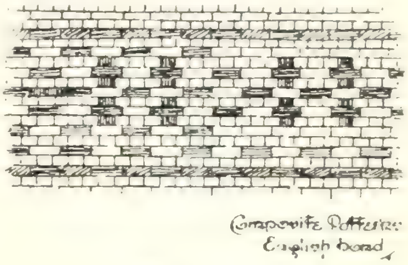


Fig. 8

Figs. 20 and 21 illustrate another more advanced stage by two different patterns in sunk work introduced in projected panels. The latter may, of course, be left quite plain in solid panelling, if desired, or decorated with color-reliefs instead of the sunk patterns shown. The pattern itself could also be projected slightly as a still further variation. This stage of solid and decorated panel-work, however, requires a section to itself, merely to partially illustrate the many possibilities of this branch. Other patterns—so well known, in fact, as not to require illustrating here—are the diamond and cross, formed in stepped fashion, or the diagonal, by running through the customary brick coursing. These two examples form practically the sole patterns and only method of "brick relief" or "ornament" at present. At the same time, even these possess possibilities in the way of fresh developments.

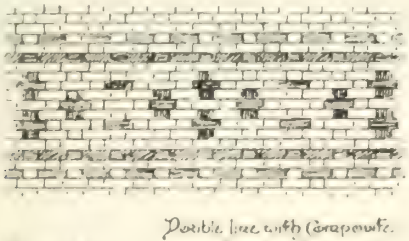


Fig. 9

The illustrations to this chapter have been kept quite plain for the sake of simplicity; but it is well to note that the patterns can be still further elaborated by using various moulded bricks as indicated in Chapter I. By these methods, a larger degree of enrichment, variation, etc., might be still further introduced. Regarding the constructive side of raised and sunk work, also as viewed with respect to the bonding. A great deal can be done in this direction with a very slight amount of extra trouble beyond that involved by ordinary plain brick building, and that merely being incurred by a little more care requisite in the actual setting of the projected or recessed bricks. These must, of course, be kept at a uniform level throughout any particular piece of work. As a rule, very little projection or recession is required to obtain the best results in light-and-shade effect on any average building—for instance, on three or four-storey structures—a ¼-in. to ½-in. projection or recession being quite sufficient to pick out a pattern and produce the requisite degree of ornamentation without coarseness. The latter effect being incurred if these dimensions are exceeded to any extent—unless this point has to be specially considered for greater heights than those mentioned above. With sunk ornament used in 9-in. work, the pattern would, of course, appear reversed on the inside. Here it would form either a good key for the plaster, or in some cases, where the inside is

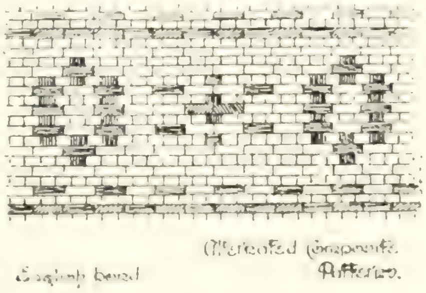


Fig. 10

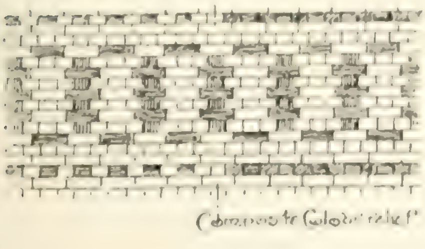


Fig. 11

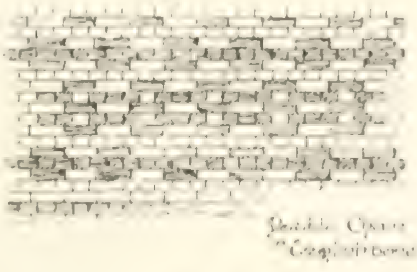


Fig. 12

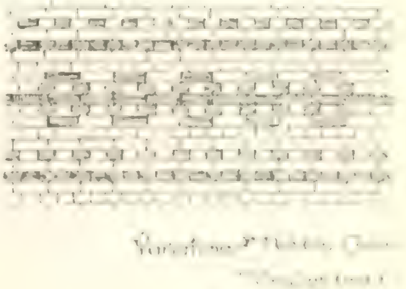


Fig. 13

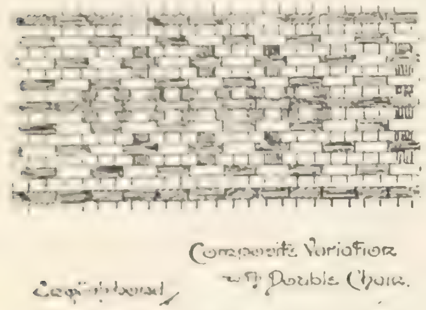


Fig. 14

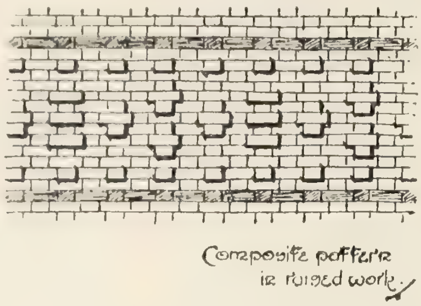


Fig. 16

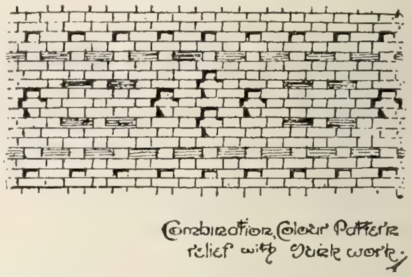


Fig. 17

left in plain brickwork, it might very well be arranged to form an internal relief as well. With walls of greater thickness, it might be occasionally necessary to rough-cut recessed bricks to prevent considerable displacement or contrivance with the bonding. With by far the majority of work, however, even this point can be got over by utilising a queen closer or half-brick for the recessed portion, making up the difference of internal space with a thickness or two of rough-cut tile, as the case may be. The latter would usually be found cheaper and more convenient than carefully cutting down the bricks to a required size. Thick tiles of narrow widths can also be usually obtained which would form a convenient size for adaptation to this work where a greater depth of shade, with consequent projection, might be desirable for ornament placed at some height. This system of using tiles would, of course, be just as useful for making up similar internal spacing formed by projecting bricks. These points are worthy of note, although such particular treatment would really only be essential where, from a purely constructive view, it would be necessary to make every part of a wall uniform throughout. In a great deal of average work, with no exceptional stress upon it, the slight spaces involved by these methods of pattern-work might very well be filled in with the mortar, or in some instances, where running a trifle wider, with a little extra mixture in cement. The above are all points which require due allowance being made for, according to the nature of a pattern used, and whether the internal discrepancies involved might, in the aggregate, materially affect the strength of a wall at this point. Such as, by using closely-set patterns in combination with some depth of same. That such, however, are well worthy of study, and due allowance being made for them, should be quite apparent. The proper study of brick ornamentation is quite an art in itself, although very little indeed is ever, or has been, done in this direction.

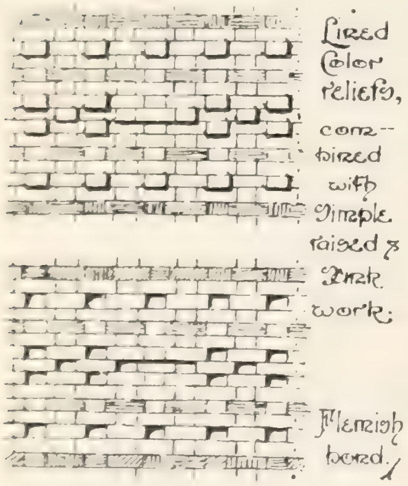

Lined Color reliefs, combined with simple raised & sunk work;
Flemish bond.

Fig. 15

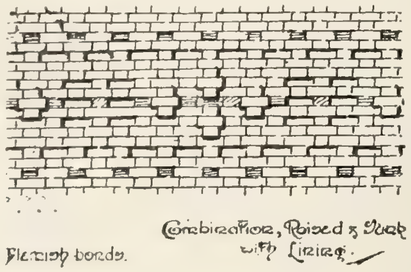


Fig. 18

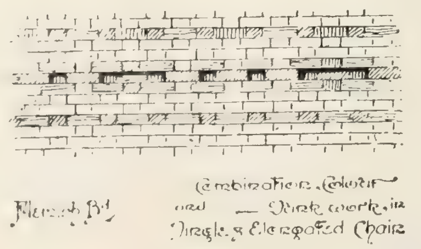

Flemish Bd
Combination Colour and Sunk work in Single & Elongated Chain

Fig. 19

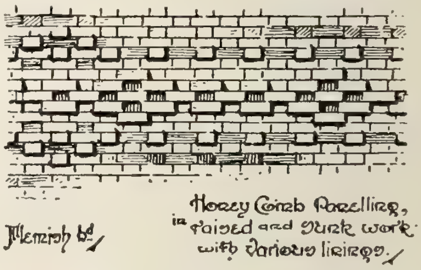

Flemish Bd
Honey Comb Panelling, in raised and sunk work with various linings.

Fig. 20

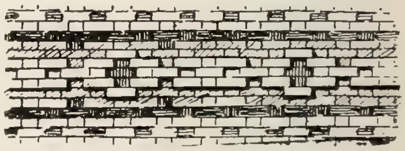


Fig. 21—Flemish Bond. Panelling, raised and sunk.

There are many examples on every hand, to the extent of acres and acres of buildings in every city and town, possessing some vague attempt at doubtful "decoration" in an equally doubtful "ornamental" manner, by means of the introduction of various discordant pieces of stone or cement, grotesque in shape and totally out of proportion. A stranger to this planet might well think that brickwork itself was some novelty in building material just introduced, instead of having been the commonest constructive one in existence for many centuries, to the extent of some thousands of years. With such a wealth of ornament at command, too, in its own material, more effective and beautiful, because natural, instead of an artificial foreign substitute introduced for show and gaudy effect. Natural brick ornamentation only requires proper study and treatment for its development to a much wider field than would appear possible at first sight, even to the average highly-trained professional. It would be quite possible to fill a whole volume with designs, compositions, variations, etc., in the sections treated here alone, which have merely been lightly touched upon, so far as space permits. In tracing out somewhat the variations, etc., possible, as applied to the same pattern, it has probably shown best how to deal with this system of ornament. Fresh designs would doubtless occur also to others inclined to give the subject serious consideration, having some basis to work upon.—**Building News.**

Waterproofing Concrete Floors

CONCRETE floors should never be treated or dressed until they are thoroughly dry and well seasoned, and the dressing should be applied before they have been subjected to traffic or wear. In some instances it is necessary to use an acid wash or some other neutralizing medium before applying any dressing to concrete floors.

When the concrete is thoroughly dry and seasoned, two coats of concrete floor dressing should be applied. Making a cement mortar veneer of one-half inch thickness, and applying two coats liquid cement upon the surface, after the same is thoroughly dry, produces a sanitary and light radiating basement.

Concrete floors having exceedingly fine, close texture, floated to a dense surface, which carry at times a semi-gloss finish, should be treated as follows: The surface should be gone over lightly with a carborundum rubbing brick in order to establish a bonding surface that will enable the concrete floor dressing to knit close to the floor structure and practically become integral with it. This will prevent scalping and peeling of the floor dressing. The floors should, of course, be cleaned, thoroughly dry, and well seasoned before the first or priming coat of concrete floor dressing is applied. Transparent floor dressing or any color desired may be used. It should be applied by means of a suitable brush, preferably a flat 5 or 6-inch white bristle brush. The dressing should be worked well into the pores of the concrete, spreading it well over the floor surface to develop a thin film. The temperature conditions during the periods of application and drying should not be under 70 degrees Fahrenheit to insure the best results. The second coat should not be applied until the first or priming coat is thoroughly dried, which under proper temperature conditions requires from two to three days. The second coat should be brushed out evenly and uniformly over the surface in the same manner as one would apply a finishing coat of floor varnish, and it should be given from four to six days for thorough hardening. Two coats develop a very satisfactory result, though three coats should be used where floors are submitted to unusual wear, such as floors that are used as passages, aisles, and runways over which heavy trucking is done.

Concrete floors of exceedingly coarse mixture should be cleaned, thoroughly dry and well seasoned before the first or priming coat of floor dressing is applied. Either the transparent floor dressing or any color desired may be used, and should be applied by means of a suitable brush, such as is described for use on concrete floors of fine texture. The dressing should be worked well into the pores of the concrete in order to bond and bind it thoroughly. The temperature conditions during periods of application and drying should not be under 70 degrees Fahrenheit to insure the best results. After the first coat is thoroughly dry all surface areas or spots which may show unusual absorption or penetration of floor dressing should be "touched up" or gone over with an additional coat of dressing, in order to prepare a uniform surface for the finishing coat. After the first coat is thoroughly dry, the finishing coat should be applied, brushing same out evenly and uniformly over the surface, as described in the specification for concrete floors of fine texture. The finishing coat should be allowed to harden from four to six days.

Concrete floors of normal, uniform texture should be cleaned, thoroughly dry, and well seasoned when the first or priming coat of concrete floor dressing is applied. In this instance, as well as others, the transparent floor dressing, or any other color desired may be used, and it should be applied by means of a brush, and worked well into the pores of the concrete.

Floors which are laid in colors, such as terra cotta, green, etc., or where inert colors are mixed throughout the cement veneer or wearing surface, after being thoroughly cleaned, dried and well seasoned, should be given two coats of transparent floor dressing, applied under the same conditions as is described for the normal or uniform texture.

St. Irenee Church, Montreal

THE St. Irenee Church, designed by Messrs. MacDuff & Lemieux, Montreal, is to be constructed on a site at the corner of Atwater avenue and Delisle street, Montreal. It will be 140 by 80, the exterior being of stone and brick with terra cotta lining. The interior is of plaster with decorations of white, gold and ivory. The plans show three altars, one main and two secondary, and these will be of an ornate character. Seating accommodation for 1200 people is to be provided, the seats being of inlaid birch. In the basement a chapel will be constructed; this will seat three hundred people. The roof is flat and the main portion will therefore be in the centre of the church. A sprinkling system is to be installed in those portions where experience has shown that fires generally originate. The lighting will be electric and gas, and the heating will be by means of hot water. The contract for the brick and stone work has gone to Messrs. Filion Bros., and that for the inside structural work, painting, carpentry, &c., to the C. Pauze & Sons Company, Limited. The church will cost $140,000.

St. Irenee Church, Montreal. Architects: MacDuff & Lemieux.

Circular Stone Stairs

STONE stairs are an advantage over wood inasmuch as they are much simpler in construction, but the steps are heavy and require substantial walls for their support; moreover they become smooth under the friction of continual wear and then are very apt to become slippery and dangerous.

Stone steps are generally solid blocks and should be worked on the tread and the rise in superior stairs as is shown in Figure 1. The soffits are also wrought and the nosings moulded.

In setting out the stair for the purpose of making the mould, the first point to be considered is the plan and the tread and rise of the steps.

Figure 1 shows the plan of a circular stair with two up flights. The steps are built into the wall of the staircase in the one end and are supported on a stone balustrade at the other.

Figure 3 shows a section of the balustrade and it is with a view to setting forth the principles involved in the drawing and working of this part that this article has been written.

Figure 1 shows the plan of the stair with the balustrade following the inclination or rake of the steps.

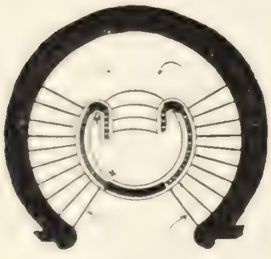


FIG 1

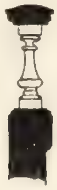


FIG 3

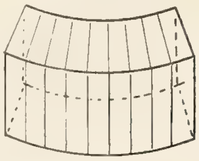


FIG 2

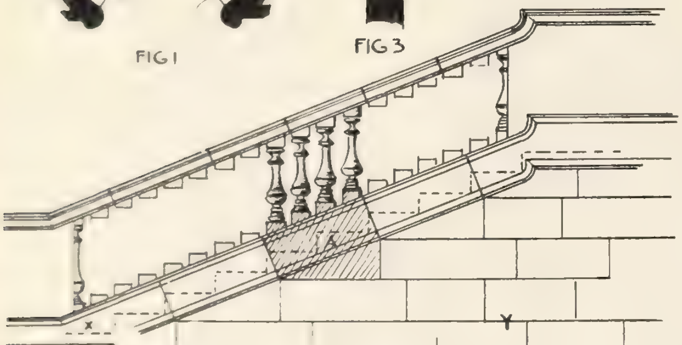


FIG 4

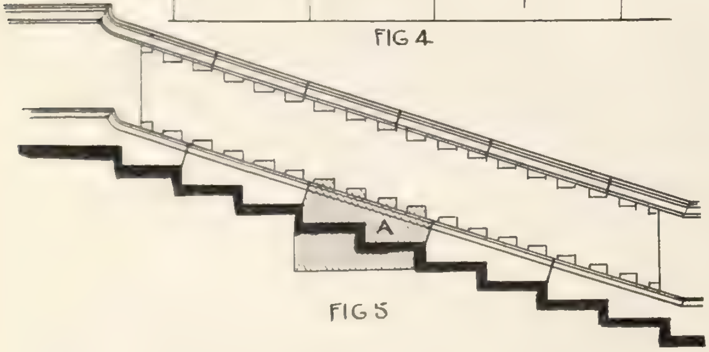


FIG 5

The balustrade being circular on plan causes a certain amount of twist in its working.

The method here shown is not probably the most profitable, but it is comprehensible and more true in form than when worked with a complication of moulds and bevel with a view to saving a small portion of the rough material.

The plan of the stair has now to be drawn down full size and the position of the balusters marked off. Then proceed to mark off on a height rod the various risers, allowing 1/8 of an inch for each front of the stone steps.

In proceeding to draw the developed elevation of the left hand side, Figure 4 shows the outside of the balustrade or the developed lines of the concave side of the plinth. That is to say, the horizontal line XY on the plan when straightened out is equal to the line XY on Figure 4.

The line of inclination is a vertical line, as the steps are of equal tread and rise, therefore the plinth starts with a straight line parallel to the nose of the steps.

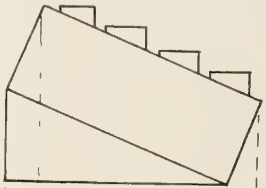


FIG 6

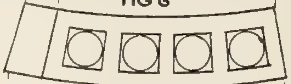


FIG 7

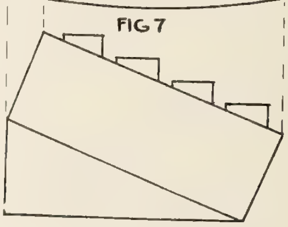


Fig. 8

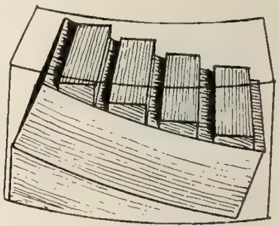


FIG 9

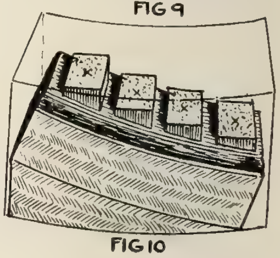


FIG 10

On Figure 4 the joints are set off convenient to the size of the stone.

Figure 5 shows the development of the convex or stair side of the plinth.

The joint here requires to be set off to correspond with the joints on Figure 4. To do this, transfer the joints from Figure 4 to the plan Figure 1 and have them drawn across the thickness of the balustrade and to radiate to the center of the plan.

The position of the joints on the convex side should now be transferred to Figure 5, and the elevation completed.

For the purpose of illustrating the method of making the moulds and the working of the material, the stone A has been selected. The bed mould is shown at Figure 7. The concave or outside mould is shown at Figure 6, and the convex or stair side is shown at Figure 8.

The stone required to work this block will be rectangular in shape, and the length will be the extreme length of the bed mould. The width will be equal to that across the cord side of the mould, and the height will be that of the face mould. The stone should be wrought on the top and bottom beds, each surface of operation being parallel and the height equal to the face mould.

Scribe the bed mould on each bed, bonding the points so that the surfaces are out of twist.

The stone should now be cut through on both faces, which will bring the stone to the true segment of a hollow cylinder as shown at Fig. 2. Now, apply the face mould, Fig. 8, on to the convex side and the mould Figure 6 on to the concave side, work the joints through and scribe on the section mould, which will be obtained from Figure 3.

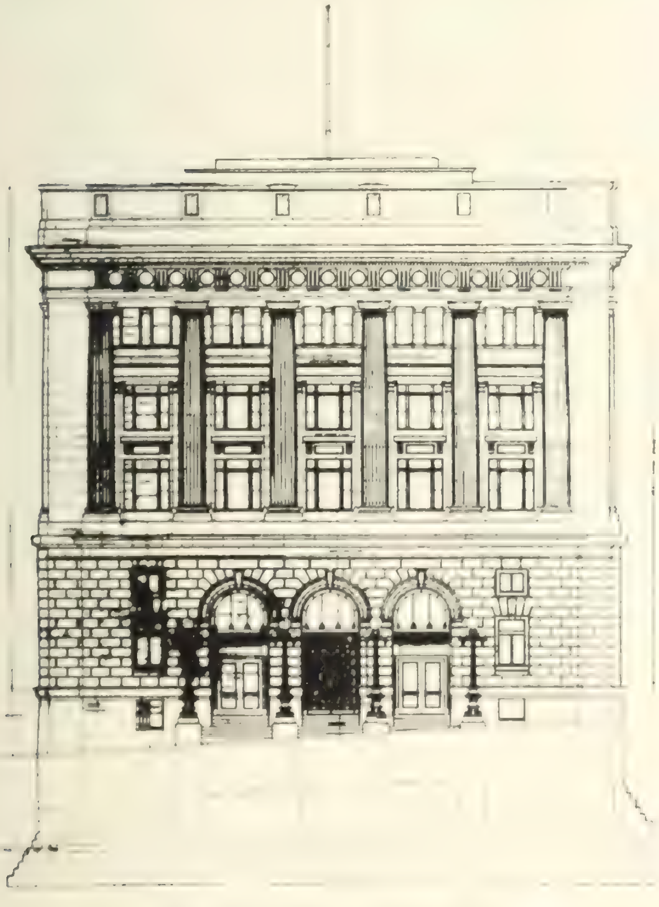
Cut off all the superfluous waste down to the top of the plinth and clean through the beds and seats for the stone balusters, as shown at Figure 9.

Next, gauge the width of the baluster's seats to the concave and convex side, and work the same, thus completing the plinth stone as shown at Figure 10.

Each of the other plinth stones are similar and as the working of the capping for the balustrade is precisely the same as the plinth; namely, by working first a segment of the cylinder, then scribing on the face moulds, and the cutting and applying of the section mould, the working of the raking moulding on both faces will be easily followed.—Jno. Y. Dunlop in the National Builder.

Montreal City Hall Annex

THE Montreal City Council have approved the plans for the annex to the City Hall, which will be built fronting on Gosford street and facing the Champ de Mars. Messrs. Marchand & Haskell are the architects for the work. The growth of the city has necessitated this addition, which will provide accommodation for the Recorder's, police, detectives, municipal assistance and hygienic departments. The building will be five storeys and basement. The front will have a Doric colonnade on a rusticated base, with pilaster treatment on the side streets. Stanstead granite will form the base of the exterior, the balance being of sandstone with brick backing. The steel columns will be fireproofed, terra cotta and concrete also entering into the structure. The interior construction will be terra cotta arches and partitions. The roof is to be of a reinforced concrete base. The entrance steps will be made of granite, while the floors will consist of ceramic mosaic, with marble borders. The interior will be finished with selected white oak. Electric elevators are to be installed. The main entrance is to be on Gosford street. In the sub-basement provision is made for the machinery, boilers, coal, etc. On the St. Louis street entrance to the basement, a driveway is to be constructed for the prisoners' vans, and on the same floor will be the prisoners' cells and cell rooms. On the Champ de Mars side of the ground floor are to be situated the police headquarters, with special entrance, and on the St. Louis street side the detective headquarters. Dormitories for the police and detectives are also to be provided in the mezzanine storey.



Front Elevation, Montreal City Hall Annex

Two Recorders' Courts and Recorders' Offices will be on the first floor. Here, too, will be three judge's rooms and the department of municipal assistance. The Recorders' Courts will be two storeys in height. The second and third floors will be devoted to the department of hygiene, while the laboratories will be situated in the attic.

A reinforced concrete levee has been built in connection with the reclamation work in the Lizbon district, Yoho County, Cal. The structure is about 2½ miles long. The concrete slab is 4 in. thick with a double system of wire reinforcement and varies in width from 46 to 74 ft. It is held in place by wooden piling at the bottom of the slope, aided by an 8-in. key of concrete extending the full length of the levee. Wooden strips are set in at intervals to allow for expansion.

The use of water for hydraulic elevators in Springfield, Mass., is to be prohibited after July 1, 1912. The Board of Water Commissioners report that exceptions to this restriction may be made in the case of ash and freight lifts operating through less than one storey in height and at a speed not exceeding 12 ft. per minute, small passenger elevators in strictly private residences, in cases where any other motive power is practically precluded, and in cases when the exception is not inconsistent with the public interest. A number of elevator owners have already made the change from the direct system and a general compliance with the order, it is stated, will remove to a considerable extent the menace of serious water hammer and its attendant dangers.

Waterproofing over a tunnel roof which is believed to be twenty to forty years old was examined and found to be in good condition in making changes at the entrance to the new Grand Central Terminal in New York, according to notes by George W. Kittredge, chief engineer of the New York Central & Hudson River Railroad, furnished to the committee on masonry of the American Railway Engineering Association and included in the committee's last report. The tunnel runs under Park Avenue, and has a roof of iron beams and brick arches backed with concrete and covered with about two feet of soil in the parking at street level. Drains were provided so that the water did not stand in the earth. The waterproofing, which was laid directly on the concrete of the tunnel roof and covered with the earth, consisted of felt and coal-tar pitch, three plies of felt being used. It is considered probable that the materials were placed nearly forty years ago, and the vegetation over the tunnel indicates that it must be at least twenty years old. Upon its removal it was found that the paper had become somewhat brittle, and that the pitch was harder than that now used, but the sheet was intact and capable of shedding water. It is stated that small leaks would not have been detected.

Canadian Consulting Engineers

Mr. T. Aird Murray, Mem. Can. Soc. C. E., Toronto.

AN engineer who has attained eminence as a specialist in water supplies, sewerage and sewage disposal is Mr. T. Aird Murray, of Toronto. Mr. Murray is of Scotch parentage and was born in Scotland in 1866. His early education was obtained at the Royal Grammar School of Newcastle and continued at the Armstrong Institute of Science and at the Durham College of Science. He service his articles of apprenticeship in Newcastle-on-Tyne with Mr. Alfred S. Dinning. His early training, although including general engineering routine, was connected more especially with schemes of sewerage, sewage disposal and water supply, as this class of work formed one of the chief features of Mr. Dinning's business. After the termination of his apprenticeship, Mr. Murray continued with Mr. Dinning for a period of about three years and latterly assumed the position of his chief assistant.

In the year 1891, Mr. Murray resolved to devote his energies entirely to work connected with sanitary engineering and was elected to the position of consulting engineer to the North Eastern Sanitary Inspection Ass'n., with headquarters at Newcastle and Manchester. He held this office until 1894, when he entered into private practice as a sanitary consulting engineer in the North of England. Mr. Murray maintained his practice for a period of twelve years, during which he was responsible for a great number of sanitary engineering schemes in connection with municipalities in the North of England. He also devoted considerable time and attention to the purification of trades wastes in Yorkshire and Lancashire.

Mr. T. Aird Murray

Mr. Murray disposed of his business in England in 1907, and came to Canada early in 1908. During his first year in this country he occupied himself in travelling, collecting data and studying local conditions with reference to sewage purification and water supply. His knowledge of these subjects, as applied to European and British conditions, being complete, he desired to find out just how far and in what respect standardized Old Country methods were applicable to Canadian conditions.

Early in 1909 he resolved to commence practice as a sanitary consulting engineer in Canada and formed a partnership association with Mr. Andrew F. MacAllum, now City Engineer of Hamilton. In 1910 he opened offices on his own account in the Lumsden Building, Toronto, where he continues to practise as a consulting engineer specializing entirely in water supply and sewerage.

In 1909 Mr. Murray was retained by the Provincial Government of Saskatchewan in connection with the Bureau of Public Health to advise upon questions of stream pollution and pure water supply, and he continues to hold a retainer from that government. The Commissioner of Health, Dr. M. M. Seymour, has had occasion several times to refer publicly to the valuable work he has done in Saskatchewan, and it is acknowledged that the Province generally is in advance in such questions as sewage purification and care of water supply.

Mr. Murray's name has become almost synonymous with the chlorine treatment of water supply in this country. In the early spring of 1910 the city of Toronto was wrestling with a severe typhoid outbreak due to impure water supply. Mr. Murray stepped in and voluntarily gave Mayor Geary exact information as to the benefits which would at once arise from the application of small quantities of hypochlorite to the impure water. The method was at once adopted with such results that the Board of Control on behalf of the citizens tendered a vote of thanks to Mr. Murray in a letter under the mayor's signature. It has been acknowledged by Dr. Amyot and other authorities that this one suggestion has saved many lives during the recent city water troubles. Mr. Murray is a great believer in the efficiency of hypochlorite. In connection with most of his sewage disposal schemes he provides that the effluents are disinfected by this process.

Mr. Murray appears to have settled in Canada at the pyschological moment—just when a demand was arising for a man with his special qualifications and knowledge. The important questions of pure and wholesome water are receiving acute attention from most municipalities and governments and it is being recognized that the high death rate which exists in such diseases as typhoid, etc., are due to past carelessness and neglect. The combination of certain chemical, biological and hydraulic engineering knowledge which is essential to sanitary engineering, appears to meet a decided demand in Canada at present, and this demand is likely to grow. The proof of the demand exists in the multitude of business engagements which call Mr. Murray to practically all parts of Canada. Apart from his Saskatchewan work, he is at present acting as consulting engineer for cities and towns in Alberta, and for several important towns and cities in Ontario. Recently he has reported upon the necessity of one of the largest water schemes ever proposed in Canada, viz., the diversion of part of the Saskatchewan River for domestic supply for the cities of Moose Jaw, Regina, Weyburn and adjoining towns and district, and a commission consisting of representatives of the Provincial Government and the three railway corporations has been formed to deal with the matter. Mr. Murray is also identified with the water supply of Toronto, inasmuch as he is one of four expert commissioners appointed last year to report upon the whole question of water supply for that city. The report we understand is now completed and is awaited from the printers.

Mr. Murray, although a busy man, finds time to contribute a large amount of literary work in connection with his special knowledge, and is the author of several important publications and articles. He is a great believer in propagandism and takes an active interest in the proceedings of the Canadian Public Health Association, being convener for the engineering section, and secretary for local arrangements for the forthcoming annual conference in Toronto.

Personal Mention

Mr. Jno. O'Neill has been appointed City Engineer of Fredericton, N.B., in succession to Mr. J. L. Feeney. The initial salary is $800 a year.

Report comes from Vancouver of the death of Edward Brown, aged thirty, a sub-contractor, who was killed in a dynamite explosion at North Vancouver.

Mr. A. B. Manson, superintendent of construction for the C.N.R., has been appointed City Engineer of Stratford, Ont., in succession to Mr. M. Ferguson, at an initial salary of $1,500 a year.

At London, Ont., last week, the death occurred of Mr. Geo. Borden, builder and contractor. The late Mr. Borden was born in Devonshire, Eng., in 1846. He first went to London, Ont., in 1869.

The annual dinner of the Regina Engineering Society was held at Regina on May 2. Among those who spoke was Mr. L. A. Thornton, the former city engineer of Regina, now a commissioner for that city.

Messrs. W. C. Lancaster, H. T. Fisher and J. C. K. Stuart have been appointed assistant engineers on the staff of Mr. Stephen P. Brown, who is now in charge of the construction of the Mount Royal tunnel of the Canadian Northern Railway, leading into Montreal.

Among those who were lost on the "Titanic" was Mr. Geo. Wright, of Halifax, uncle of Mr. Geo. Wright, City Engineer of London, Ont. Under the will, which was executed in London on the day before the testator sailed for America, City Engineer Wright is a beneficiary to the extent of $12,000. The legacies provide for the distribution of about $275,000.

Mr. C. Stanley Martin has been appointed superintendent of the Steel Company, Sydney, N.S., in succession to Mr. C. H. McMillan, who resigned. Mr. Martin, who is an Englishman, was for several years manager of Cammell, Laird & Company's works in Cumberland, England, and for the past two years has acted in important consultative capacities in Cardiff, Wales.

Mr. Robt. Potter, City Engineer of Fernie, B.C., who was recently appointed City Engineer of Regina, Sask., will not enter upon the duties of the latter office as he is taking a partnership in the J. A. Broley Company, engineers and contractors, with headquarters at Calgary. The new company have recently been awarded contracts A and O on the High River water and sewerage installations. Mr. Potter has had extended experience in the construction of sewerage systems, and in municipal work especially,—a fact which augurs well for the success of the new firm.

Upon severing his connection with Toronto last week Mr. C. H. Rust was presented with a cabinet of silver, a gold watch and chain and an illuminated address. The first and last named were given by the employees of the works department, while the watch and chain were presented by the civic employees as a whole. The presentations were made by His Worship, Mayor Geary. Mr. Rust will assume his new duties at Victoria about May 22. He was given a rousing send-off by many prominent officials at the Union Station, Toronto, upon his departure for the Coast.

Mr. R. O. Wynne-Roberts, M. Inst. C.E., in addition to having been appointed consulting engineer for the Regina, Saskatchewan, and Watrous, Saskatchewan, water schemes, has been engaged by the authorities of the last named city to investigate the resources of the Regina district in the matters of power, light and fuel, the installation of a generating station on the coalfields being suggested. Mr. Wynne-Roberts is the corresponding secretary of the recently formed Regina Engineering Society, the objects of which are the professional improvement of and the encouragement of social intercourse among its members.

Mr. W. Burton Stewart, vice-president and managing director of Norton-Griffiths, Limited, has returned to England. In connection with the St. John, N.B., harbor contract the company have let the excavation work to the Eastern Construction Company, Limited, of Montreal. The principals of the company are Messrs. D. R. MacDonald, of Glengarry, Ont.; H. Doheny, of Montreal, and C. L. Hervey, of Montreal. The contract is a very big one, and work will be commenced in about a week's time. The Norton-Griffiths Company have built their offices and also accommodation for the men at St. John.

Canadian Railroad Development

Canadian Pacific engineers are working in the vicinity of the Pend Oreille river, on the proposed line from Trail to Metaline Falls, where a connection will be made with the Idaho & Washington Northern Railway.

The Canadian Northern Railway, T. Lucas, Engineer Maintenance of Way, Winnipeg, Man., is to start work at once on extensions to its yards in St. Boniface, near Winnipeg. The railway will do this work itself.

The J. D. McArthur Company of Winnipeg are rapidly pushing on the work of constructing the new Grand Trunk Pacific entrance to that city and expect to have all the filling completed before the end of June. Five crews are working at the present time at a daily average of 300 cars of gravel.

The Canadian Pacific Railway will shortly commence a number of improvements in the city of Quebec. These include the widening of Prince Edward street, a yard for freight cars west of the station, the closing of the lower end of St. Roch's street, building of a roadway to connect with the Louise Embankment, besides work at the Palais Station.

The Ottawa & St. Lawrence Electric Railway Company is planning to let contracts and have construction work started this month on the section of the projected line from Ottawa south to Morrisburg, and on the section from Ottawa west to Arnprior. The company plans to build lines from Ottawa west and south. Mr. J. E. Askwith, Ottawa, Ont., is president.

Permanent directors have been appointed at London, Ont., for a proposed municipal electric railway between London and Port Burwell, touching Belmont and Aylmer. It is proposed to construct a road 26 miles in length, at an estimated cost of $20,000 a mile, to enter London over the city's own railway, the London & Port Stanley, which will mean a terminal at the present Michigan Central station. The Board of Trade of London, Ont., is interested.

[illegible] has commenced work on the Mount Royal tunnel, many workmen being engaged on the western portal to the tunnel. The work now commenced is the excavation necessary before the tunnel proper can be begun. The Harbor Commissioners have decided to raise the harbor tracks to the proper level in order that the C. N. R. line may reach the water front. The company also purpose to construct a new sub-station so that business men can travel from the busy portions of Montreal to the centre of the model city in eight minutes.

Mr. A. S. Dawson, chief engineer of the department of natural resources of the Canadian Pacific Railway, announces that contracts have been let for a million-dollar work on the irrigation block. This includes a concrete aqueduct to cost half a million, other concrete structures to cost $300,000 and thirty [illegible] to cost [illegible]. The aqueduct is the first of its design to be constructed. It will be 10,500 feet long, with a minimum height of fifty-five feet, and will irrigate 100,000 acres of the Canadian Pacific block. The contract is awarded the Grant-Smith Company of Vancouver.

The work on the building of the Banff-Windermere highway by the C.P.R. and the British Columbia Government has already started at the St. Clair end by the letting of a contract for the construction of a steel bridge over the Bow River at Castle Mountain, and the Dominion Government has made arrangements for the construction of the first ten miles of the great motor road to the boundary of British Columbia, where the B.C. Government takes over the work jointly with the C.P.R., and continue through British Columbia. This motor road will form a direct highway between Calgary and the Columbia Valley, the road at present being completed between Calgary and Banff.

It is officially announced that the directors of the C. P. R. have appropriated the sum of $1,200,000 for the proposed reconstruction of the Hotel Vancouver, and another sum of $215,000 for the power plant in connection with the hotel. The latter building is now in course of erection, and its completion is to be hurried in order that the old power building may be demolished before the construction of the main hotel building is commenced. The main hotel building will occupy the site of the hotel office or central section, and will be extended south as far as the Opera House lane. It will be at least twelve storeys in height, and two additional storeys will be added to the Georgia street wing, completed about eight years ago. It is improbable that the office portion of the building will be torn down until after the summer travel. When completed, it is said that the hotel will have the largest ground corridors of any hotel in Canada.

The Canadian Northern Railway (Mr. A. T. Fraser, District Engineer, Edmonton, Alta.), will during the construction season of 1912 spend something like $13,000,000 in Alberta on main line and various branches to be built under provincial guarantee throughout the province. A large proportion of the total will be spent on lines the bonds of which were guaranteed by the legislature at the last session. The Onoway branch to Peach River and the Goose Lake extension will be the lines upon which the work will be carried on most rapidly. In the neighborhood of 1,000 men will be at work on these two lines within the next few weeks. Work has been started on the branch from Oliver through the Pankan country to St. Paul de Metis on the Strathcona-Calgary branch. On each branch an outfit is already at work. At least 300 station men and 300 teams will be at work between the Pembina and the Athabasca River within a few days.

The Canadian Northern Railway has awarded contracts for the construction of 331 miles of new branch line extensions in the prairie provinces. One of the most important is the contract for the completion of the Goose Lake line, which has been awarded to the Northern Construction Company, Winnipeg. This calls for the construction of a gap of 110 miles, from the end of steel to Munson. Mr. W. J. Cowan, Winnipeg, has the contract for the completion of the Prince Albert-Battleford branch, on which there are 50 miles of steel to be laid, 30 miles of which have already been graded. Mr. Cowan will also build a 21-mile branch north from Canora to connect with the Thunderhill extension. This year the Northern Construction Company is to complete the Brazeau coal branch, a distance of 170 miles, 100 miles of steel being already laid on the line. The Northern Construction, in addition to the above, has the contract for the construction of 100 miles on the Edmonton-Peace River line.

Construction News and Notes

The permits issued in 33 leading Canadian cities last month totalled $20,689,988—an increase of 44.5 per cent. over the corresponding period of 1911.

The corner stone of the new Central Y.M.C.A. building at Toronto was laid on Tuesday, May 14th, by the Prime Minister, the Right Honorable R. L. Borden.

An architectural exhibition is being held in the art galleries and museum of the Public Library on College street, Toronto, and will continue for three weeks. The exhibition has been arranged by the Toronto Society of Architects.

Although Montreal was rather slow at the beginning of the season in the matter of building permits, the city has since taken out a very large number. The activity in the building trade is shown by the fact that from May 1st to 10th inclusive the permits totalled $1,417,090, a record for any ten consecutive days.

The Bonnot Company of Ohio are installing an extensive line of machinery in the plant of the Tregillus Clay Products Company, Calgary. This plant will be one of the largest in the Dominion. It will contain 20 kilns of the rectangular down draft type, each with a capacity of 200,000 brick. It is stated that the capacity of the plant will be 10,000 bricks an hour.

The reinforced concrete brush factory which is to be erected at St. John, N.B., for F. S. Simms Company, Limited, will be 400 by 50 ft. in dimensions, 4 storeys high and will be built according to the mushroom system of construction. The architects and engineers are Messrs. Lockwood, Greene & Company, Boston, and the contract has been awarded to the Aberthaw Construction Company, of Boston.

The Hastings Quarries, Limited, of Toronto, are opening a new property consisting of ten acres of white marble and sixteen acres of pink granite along the Bay of Quinte Railway, just north of Tweed. The company has bought a water-power site at Actinolite and will install an electric plant to supply power. The cost of machinery and building improvements will be about $35,000. The marble will be quarried with channeling machines.

The fine decorative marbles from the quarries at South Stukely, Quebec, operated by the Dominion Marble Company, Limited, are to be used for the interior finish of the Confederation Life Building at Winnipeg, the Royal Bank Building at Saskatoon, and the Bank of Ottawa at Regina. The Canadian Pacific Railroad has also ordered this marble for the interior work in their new building at the corner of King and Yonge streets, in Toronto.

"The New Huber" is a pamphlet descriptive of the steam road rollers, hauling engines, road sprinklers, scarifiers and dump wagons, made by the Huber Manufacturing Company, of Marion, Ohio. Huber machinery is constructed with the idea of combining great durability with highest efficiency and economy of operation. The Huber roller is particularly well adapted to the making of roads and streets, and has received worm commendation from highway engineers and contractors.

Work on the large public buildings in Winnipeg it is expected will start at an early date. The provincial police court, at the corner of Broadway and Kennedy, the drill hall and the barracks, all old land marks, are soon to disappear. Plans for the new court house on the site of the first, are practirally ready, but those for the Parliament buildings across the street, will not be ready for some time as the five chosen competitors have yet to prepare their full plans. The contract for the construction of the largest public school in the city outside of the technical high schools, was awarded to the firm of Thomas Kelly & Sons, for $187,786. The new school will be in ward three, bounded by Lenore, Buell, Bath and Wolsely streets. It will contain twenty-six class rooms, exclusive of a large auditorium and the manual training department.

Chief Tremblay, of the Montreal Fire Brigade, has asked that the revision of the building by-laws be expedited, as he says that many new structures are being erected which are not adequately protected against fire. Damages from fire are increasing and prompt action is necessary. The Committee which has the revision in hand has more than once complained that it has not received proper assistance from the Council. Ald. Clement, the chairman, has promised that a draft of the by-laws will be ready in two months.

Pamphlet J, 1912, of the Brown Hoisting Machinery Company, Cleveland, Ohio, contains a complete description of the Brownhoist pillar crane, hand-wrecking crane, mast jib crane, bracket jib crane, pillar jib crane, stationary bridge crane, and transfer table. The correct solution of the hoisting and conveying problem the company rightly claim to be a big factor in the success of any industrial business and the various lines of manufacture will repay careful study on the part of all identified with this problem. Full information will be furnished on request.

At Galt. Ont., last week, the members of the Board of Trade were addressed by Mr. W. H. Breithaupt, C. E., of Berlin, who advocated the establishment of storage dams in the upper basin of the Grand River to prevent a repetition of the disastrous flood of April 7, and also to provide a sustained flow of at least 400 cubic feet per second throughout the dry season. It was the unanimous opinion of those present that something must be done to cope with the present conditions, and a resolution was passed urging the Provincial Government or the Conservation Commission to inquire as to the adaptability of the valley of the Grand for storage purposes.

Messrs. E. F. Giberson & Company, with quarries and mills at Bedford, Ind., and New York offices at 200 Fifth Avenue, have opened a branch office at 307 Transportation Building, Montreal, with Mr. M. J. Morgan in charge. that gentleman having the entire Canadian territory. The Giberson stone has met with great favor in Canada. One of its most notable uses has been in the new Chateau Laurier at Ottawa. It has also been used in the Carlton Hotel at Montreal, and is being employed in the Fort Garry Hotel at Winnipeg, now being built. The Giberson Company are now employing a monogram, "R B," stamped on all the blocks they ship, to signify "Real Bedford."

Brick industries at the Coast would appear to be flourishing. The Dominion Shale Brick Company is operating a new plant on Gabriola Island, while the Mountain District Brick & Tile Company is building a new plant at Nanaimo, on Vancouver Island. The Sidney Brick & Tile Company's plant, which has been in operation for several years, on Sidney Island, close to Victoria, B.C., is undergoing many improvements, among which is a new continuous kiln for burning their products. The Port Haney Brick Company, of Haney, B. C., is building a new building for drying partition tile and hollow block, for which they have secured a number of large contracts.

The Builders' Exchange of Minneapolis, we are informed, has just installed a credit bureau covering the different classes of builders and sub-contractors, and giving to subscribers to the bureau, credit reports on their records. The bureau is intended to cover the work of the different building trades, and to concentrate into a single office the work which has heretofore been done through eight different departments by the different trades and material lines. It is believed that "it will result in better work at less expense and that it will also serve to give the honest contractor or sub-contractor a chance to show his condition, when temporarily hard pressed, with less chance of starting someone into suing."

The Western Canada Stone Company has been organized at Calgary with a capital of $500,000. Mr. D. C. Robinson is named as the president and Mr. J. Bryan as secretary. The new company has acquired the business interests at Calgary and Edmonton of the Quinlan-Carter Company, and also their stone quarry at Glenbow. One of the contracts they have taken over is with the Alberta Provincial Government and has sixteen years to run. The new company has also acquired an extensive sandstone quarry at Simm's Valley, 14 miles west of Calgary, which has been pronounced by stone experts to be the largest and best stone proposition discovered in Alberta. As yet, the property is without railway facilities. but the C.P.R. and C.N.R. engineers have looked over the ground with a view to building spur lines.

Doherty Patents on Gas Producer Operation Upheld in the Final Court

The United States Circuit Court of Appeals for the First Circuit has handed down a decision sustaining the earlier decision of the United States Circuit Court for the district of Massachusetts in the case of the Combustion Utilities Corporation vs. the Worcester Gas Light Company.

The question at issue in both courts was the validity of the patents of Henry L. Doherty covering a means of controlling and regulating the temperature in gas producers. The defendant in the original suit claimed that Doherty's inventions were anticipated in the prior art and were therefore invalid. The trial of the case before Judge Brown in the United States Circuit Court of Massachusetts brought out evidence most interesting both from a legal and an engineering viewpoint. It developed an unusually thorough investigation of combustion principles and methods, and the distinction drawn in many cases called for the utmost discrimination on points both of law and science.

The first trial developed the fact that Mr. Doherty "produced a new result in the art—a practical non-clinkering gas producer furnace, and made an important contribution to the art by the disclosure of what could be practically accomplished by a new way of applying old means."

The Doherty patents cover both an apparatus and a process, embracing the use of a part of the products of combustion in such a way as to restrain the temperature in the incandescent fuel bed in the producer below the point at which the ash can fuse or flux into a clinker. The result is a producer free from the troubles and expense attendant upon clinker in the furnace.

The original suit grew out of the installation of some gas benches for the Worcester Gas Light Company by a prominent builder, which were claimed to infringe the Doherty patents. Because of the importance of the questions at issue, the case commanded widespread attention and brought forth the best talent on both sides. Judge Brown, in his decision, stated that "a very protracted and careful examination of the record convinces me that Doherty made a meritorious advance in the art; that he was the inventor both of an apparatus and a new process,"—both of which have an important bearing upon the questions of fuel economy and cheap power which are so vital to-day.

The Court of Appeal—the three justices unanimously concurring—sustains the decision of the lower court completely, making no exceptions whatever. And as this is the court of last resort in such cases, the patents of Mr. Doherty are fully sustained, beyond any further question.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Ingersoll, Ont.

Sewerage system to cost $57,000. Engineers, Chipman & Power, Mail Bldg., Toronto. Plans under consideration.

Lunenburg, N.S.

Sewerage system. Tenders received until June 1st. Plans at office of Geo. H. Love, Clerk.

Napanee, Ont.

Sewage disposal to cost $5,000. Engineer, Mr. Wright, Kingston, Ont. Tenders called shortly, plans at town clerk's [illegible]

Winnipeg, Man.

Sewer extension to cost $20,690, Portage ave., from Omands Creek to Western City limits. Tenders received by Bd. of Control. Specifications office of engineer, Mr. H. N. Ruttan, 223 James avenue.

Asphalt pavement to cost $8457, Portage ave. to Western City limits. Tenders received by Bd. of Control. Specifications at office of Engineer, Mr. H. N. Ruttan, 223 James ave.

Sewers. Tenders by Board of Control until May 23rd for extensions on Wolseley ave., from Maryland street to 166 West James avenue from Transfer Track to Bertha street. Specifications at office of Engineer, Mr. H. N. Ruttan.

CONTRACTS AWARDED

Cobourg, Ont.

Sewage purification, House of Refuge. Tenders opened May 16, Murray & Spencer, Niagara Falls, Ont., $3,627; Martin Jakes, Cobourg, $2,680; Accepted, T. R. McLaren, Toronto, $1,981.36. Mr. T. Aird Murray, Consulting Engineer.

Ottawa, Ont.

Asphalt pavement, First ave., cost $23,756, to the Union Construction Co. Engineer, Mr. N. J. Ker.

Railroads, Bridges and Wharves

Fredericton, N. B.

Wharf. Tenders by Sec. R. C. Desrochers, Ottawa, Ont., Dept. Pub. Wks. until June 6th. Plans from District Engineers at St. John, N.B., and Chatham, N.B., also from postmaster at Fredericton.

Montreal, Que.

Aqueduct, cost $1,000,000, Tenders received by Board of Control. Plans at City Hall. City Clerk, L. O. David; City Engineer, Mr. Geo. Janin.

Ottawa, Ont.

Wharf to cost $8,500, Seagull, St. Josephs Island, District of Algoma, Ont. Construction rock fill, timber cribs, length 250 feet; width 16 ft. x 20 ft. cribs, 7 spans, 16 ft. long and wharf to be L shape. Tenders called shortly. R. C. Desrochers, Dept. of Public Works.

St. Catharines, Ont.

Railway extension of Niagara, St. Catharines & Toronto Railway. Line to Niagara-on-the-Lake from St. Catharines via Niagara street and Lake road, considered.

St. Peters Bay, P.E.I.

Wharf to cost $5,000. (a) Repairs to shore abutments and approaches, approximate length 250 ft. (b) Reconstructing present pier head and covering of present span. Tenders called shortly.

Upper Maugerville, N.B. Sunbury Co.

Wharf. Tenders received by Secretary, R. C. Desrochers, until May 23rd. Plans at office of District Engineer, St. John, N.B., office of the Postmaster, Upper Maugerville, and at Dept. of Public works, Ottawa.

Winnipeg, Man.

Subway to cost $600,000, Princess st. at C.P.R. tracks. Engineer, H. N. Ruttan, 223 James avenue. By-law to be submitted to ratepayers.

Bridge approaches to cost $4,539, Arlington street over C.P.R. tracks. Tenders by Board of Control, Winnipeg, until May 23rd for sandstone block pavements and granolithic walks on south end and plank walks on north end of bridge. Specifications at office of Engineer H. N. Ruttan, 223 James ave.

CONTRACTS AWARDED

Erieau. Ont.

Concrete piers to cost $20,000 for Lake Erie Coal Co. Engineer and contractor, Geo. Morgan, Blenheim, Ont.

Ottawa, Ont.

Sub-electric station to cost $10,000, Slater street, for Ottawa Electric Co. General contractor, Alex. Garvock. Architect, J. A. Ewart. 36 x 64, brick construction. Permit granted.

Port Stanley, Ont.

Breakwater, cost $210,376. General contractor, M. J. Hogan, Port Colborne, Ont. R. C. Desrochers, Secretary, Department of Public Works, Ottawa.

Serpentine River, B.C.

Dam (steel gates) for Provincial Government. General contractor, M. R. Cotton, Vancouver. Specifications at office of H. C. Bruce, Engineer, New Westminster.

Public Buildings, Churches, Schools, etc.

Calgary, Alta.

Labor Temple, 11th avenue, for Trades Council. Architect, Burroughs & Richards, Calgary. Three-storeys, 50 x 140. Plans in preparation.

Cranbrook, B.C.

Post office fittings. Tenders received by Secretary, R. C. Desrochers, Department of Public Works, Ottawa, until May 30th. Plans from W. M. MacEachran, Clerk of Works, Cranbrook. W. Henderson, resident architect, Victoria, B.C., and Dept. of Public Works, Ottawa.

Fort William, Ont.

Club to cost $5,000, for Thunder Bay Outing Club. Architect, Carl Wirth, Fort William. Bungalow, frame construction. Tenders called.

Homer, Ont.

Church to cost $6,000. Rector, A. E. Riley. 70 x 48, stone construction. Tenders received until May 24th.

Little Britain, Ont.

School. Brick veneer, and thoroughly equipped. Tenders received until May 25th by Wm. Stacey, secretary.

London, Ont.

Tenders received by Secretary, School Board, R. M. McElheran, for heating apparatus to be installed in Simcoe street, Empress ave. and Victoria street schools.

Montreal, Que.

Refrigerating plant, cost $25,000, including motors and pumps, for Bonsecours Market required. Tenders called shortly. Engineer, Mr. Geo. Janin, City Hall.

Club Hall, to cost $8,000, for The Nazareth St. Club. President, Owen C. Dawson, 851 University street. Plans in preparation.

Muir, Ont.

School to cost $6,000. Plans considered, new equipment required. Further information from chairman School Board.

Newcastle, N.B.

Court house and office, cost $35,000, for County of Northumberland. Architect, Leslie R. Fairn, Aylesford, N. S. Two storeys, 72 x 50, stone construction. Tenders received by G. P. Burchill, South Nelson, N.B.

Niagara Falls, Ont.

Collegiate Institute addition to cost $15,000. Gymnasium and assembly hall and new heating apparatus to be installed. Plans in preparation.

St. Catharines, Ont.

Sunday School for St. Georges Church, Church street. 2-sty., 80 x 48, Tenders close May 31st. Plans at office of architect A. E. Nicholson, 46 Queen street.

Toronto, Ont.

Addition to Deaconess Home, Pembroke and Gerrard street. Architects, Gordon & Helliwell, Confederation Life Building. 3-sty., 101 x 60, brick and stone. Tenders open.

CONTRACTS AWARDED

Dorchester, Ont.

Anglican Church to cost $12,000. Rector, Rev. H. Sutton. Contractor. Craig

Bros., Dorchester. 1-sty. and basement, brick construction. New furnishings required.

Lindsay, Ont.
Sunday School additions for Cambridge Street Methodist Church. Contractor, G. H. Lindsay. 2-sty., brick construction.

New Westminster, B.C.
School to cost $32,150, 7th avenue. Architect, Gardiner & Mercer. General contractor, Wm. Forrester. Electrical—Parker Chace Co.; plumbing and htg.—James Murphy; iron work—J. McMurphy. Work started.

Ottawa, Ont.
Synagogue to cost $35,000, Rideau st. General contractor, W. Adamson, 167 Friel street. 50 x 60, solid brick construction.

Winnipeg, Man.
Hall and Club to cost $7,000, Mountain and MacGregor streets, for German-Hungarian Society. Architect, J. H. G. Russell, McArthur Bldg. Contractor, G. Pschocider, 513 Redwood ave. Brick construction. 2-sty. and basement.

Yorkton, Sask.
Public School. Architect, J. Pender West, 607 Somerset Block, Winnipeg. General contractor, Ritchie & Walters, Portage La Prairie, Man.

Residences

Calgary, Alta.
Apartment house to cost $25,000 for Mr. Baird, 4th street west. 3-sty., solid brick construction. Plans ready.

Residence to cost $7,000, Mt. Royal., for Rowley & Carver, 1015 19th avenue west. Two and a half storeys, 30 x 32, frame construction. Plans ready.

Apartment house to cost $30,000, 3rd street east, for A. C. Dafoe. Architect, Laing & Smythe, Beveridge Block. 3-sty., 94 x 50, brick construction. Tenders closed.

Dutton, Ont.
Residence to cost $3,200, for R. P. Teekie. 2-sty., 24 x 40, brick construction. Plans considered.

Hamilton, Ont.
Addition to residence, cost $4,000, Mountain Top, for T. H. Pratt, 20 James street north. Architect, H. H. New, 28 James street south. Tenders called.

Montreal West, Que.
Two residences, cost $8,000, Percival ave., for W. Percival, Montreal West. Designer and general contractor, E. W. Barnes, 2126 Mance street. Two and a half storeys, 64 x 32. Plumbing, heating and electric wiring tenders close May 24th [illegible]

Napanee, Ont.
Two residences to cost $7,000, Centre street, for W. H. Hunter. 2-sty., brick construction. Plans ready.

Ottawa, Ont.
Residence to cost [illegible],000 Woodlawn avenue, for T. F. Drake, 326 Metcalfe street. Architect, J. P. McLaren, 104 Sparks street. 3-sty., brick veneer construction. Separate or bulk tenders called.

Outremont, Que.
Residence to cost $6,000, Durocher st., for D. Lapierre, 2228 Esplanade avenue. Architect, L. Trudel, 238 St. Andre st. 2-sty., 25 x 40, stone construction. Foundation in.

Residence to cost $12,000, for G. N. Goodbody, 549 Durocher street. 2-sty., 25 x 40, brick and sandstone construction. Excavation finished.

Residence for M. Gabard, 1652 Hutchison street. Architect, G. Monette, 97 St. James street. Tenders called next week.

Pelee Island, Ont.
Residence to cost $3,500, for A. M. McCormack. Architect, Crane & Pennington, Windsor. 2-sty., 30 x 40, frame construction. Plans ready and tenders called next week.

Toronto, Ont.
Apartment house to cost $40,000, Crescent and Rosedale roads, for Dr. S. T. Floyd. Architect, Henry Simpson, 82 King street east. Mason, J. W. Gratton, 488 Clinton street. Carpenter, J. McKenzie, 447 Gladstone avenue. 3-sty. and basement. Tenders open.

Residence, cost $4,500, St. Clair ave., for R. A. Shields, care W. J. Ross, 247 Avenue road. Architect, Andrew Rollo, 12 Queen street east. Two and a half storeys, brick construction. Tenders open.

Two residences, cost $8,000, D'Arcy street rear of Beverley, for J. Kennedy, Arthur, Ont. Two storeys and attic, 36 x 44, pressed brick construction. Plans in preparation.

Four dwellings, cost $8,500, Eaton ave., for P. H. Lambert, 97 Ann street. Architect, J. G. Hedges, 34 Yonge street. Two storeys, 60 x 44, brick construction. Tenders open.

Residence, cost $3,000, S.S. Rosemount ave., for T. M. Arthur, 575 Brock ave. Architect, J. H. Galloway, 23 Toronto street. Two storeys and attic, brick and stone. Tenders open.

Residence, cost $5,000, Indian road, for Arthur Stephens, 278 Wright ave. Two storeys, brick and stone. Tenders received by owner.

Residence to cost $3,200, 68 Langley avenue, for O. P. Johnston, 27 Victor avenue. Architect, T. R. Hollingsworth, 46 Beech avenue. 2½-sty., brick. Plans ready.

Residence to cost $4,500, for P. W. Hodgetts, Clarkson. Architect, Designing & Draughting, 36 Toronto street. 2-sty., 36 x 34. Tenders called in about 3 weeks.

Residence to cost $5,000, Glengrove avenue, for E. Cork, 528 Lansdowne ave. Architect, P. H. Finney, 79 Adelaide east. 2½-sty., 38 x 45, brick construction. Tenders open.

1 pair residences to cost $4,000 for T. Ratcliffe, 195 Bain ave. Architect, P. H. Finney, 79 Adelaide east. 2-sty., brick veneer. Tenders open.

Four attached dwellings to cost $5,000, Millicent street, for E. J. Cannon, 101 Wallace avenue, Architect and Builder. Brick and stone construction. Tenders open for all trades but masonry.

Residence to cost $6,000, High Park Boulevard, for R. W. Prittie, 1 High Park Boulevard. Architect, Designing & Draughting Co., 36 Toronto street. 2½-sty., 30 x 38, brick and stone. Tenders close May 23rd.

Residence to cost [illegible] avenue, for W. C. Charters, 808 Kingston road. Builder, H. McKay, 1604 Queen street east. 2-sty., brick. Tenders open for all trades but carpentry.

Residence to cost $5,000, Laughton avenue, for G. H. Harron, Duggan ave. Architect, P. H. Finney, 75 Adelaide E. 2½-sty., 24 x 35, brick and stone construction. Plans prepared and tenders open.

Eight pair semi-detached residences to cost $16,000 for S. Slatky & Co., 2124 Dundas street, architects and builders, 2-sty., brick and stone construction. Plans considered.

Pair residences to cost $4,000, 269-71 Rayer avenue, for Fred. G. McBien, 1000 Bloor street west. 2½-sty., brick and stone construction. Tenders open.

Residence to cost $3,600, Grenadier road, for Eaton & Hunt, 324 Ossington ave., architects and builders. 34 x 23, brick construction. Tenders received by Dr. C. L. Eaton, 324 Ossington ave.

Three attached residences to cost $8,000, 24 Roxton road, for J. F. Alexander, 98 Sorauren avenue, architect and builder. 2½-sty., brick and stone. Plans prepared.

2 pair dwellings to cost $8,000, Montray street, for C. Woods, 335 Brock ave. Builder, Rumney-Smith & Co., 886 Dufferin street. 2-sty., brick. Tenders open.

1 pair dwellings to cost $5,000, Briar Hill avenue, Eglinton, for J. McLaren, 9 Hazelton avenue. Architect, P. H. Finney, 75 Adelaide street E. 2½-sty. 32 x 14, brick construction. Tenders open.

2 pair dwellings, Marchmont road, for Jas. Delworth, 46 Hampton ave., builder and architect. 2-sty., 36 x 40, stone and brick construction. Tenders open for heating, wiring, roofing and plumbing.

Residence to cost $6,000, Balsam ave., for W. J. Calgey, 277 Berkley street. Architect, P. H. Finney, 79 Adelaide east. 2½-sty., brick construction. Tenders open.

Residence to cost $4,000, Sherbourne street and Wilton avenue, for G. A. McTaggart, 268 Dovercourt road. Architect, P. H. Finney, 75 Adelaide street E. 2&-sty., 20 x 50, brick and stone. Tenders open.

Residence to cost $5,500, Indian road, for David Holland, 588 Lansdowne ave. Architect, David E. Smith, 77 Victoria street. Brick construction. Plans ready.

Residence to cost $5,000, Wells Hill ave., for T. Holmes, 120 Wells street. Architect, J. H. Stanford, Bloor and Ossington avenue. 2½-sty., brick. Tenders open.

Apartments to cost $7,000, 53-5 Leplante ave., for R. B. Burkell, 186 Rusholme road, builder. Architect, W. C. Mason, [illegible] avenue. Tenders open.

Pair semi-detached residences to cost $5,000, Marchmont road, for Jas. Delworth, 46 Hampton avenue, architect and builder. 2½-sty., 36 x 40, brick and stone. Tenders open for plumbing, heating, wiring and roofing.

Residence to cost [illegible] Indian [illegible] Owner and builder, D. A. Peacock, 577 Church street. Architect, J. A. Harvey, Manning Chambers. 2½-sty., brick. Tenders open.

Westmount, Que.
[illegible] Grosvenor ave. Owner and contractor.

S. H. Newton & Birks, 108 Crescent St. Tenders called for plumbing and heating and electric wiring shortly.

Semi-detached residences, cost $20,000, for T. S. Hudson & Co., Board of Trade Bldg., Montreal. Two storeys and [illegible] brick and concrete construction. Tenders after May 25, 1912, for marble tile, brickwork, painting, glazing, plumbing and heating, roofing, electric wiring and iron work.

Residence to cost $18,000, Argyle ave., for A. O. Dawson, Argyle ave., Westmount. General contractor, Byers & Anglin, 65 Victoria street. Tenders open for roofing, heating, plumbing, electric wiring, marble and tile.

Residences, Cambridge street, for P. & M. Glickman, 124 St. Lawrence Blvd. Architect, Dufort & Decary, LaPatrie Bldg. Tenders until May 27, 1912. 3½-sty., 25 x 72, brick.

Three apartment houses, Western near Olivier ave., for L. L. Jacobs, 356 Wood avenue, Westmount. Architect, Finley & Spence, Beaver Hall Hill, Mtl. 3-sty., 25 x 90, brick and stone construction. Tenders open.

Residence to cost $6,000, Western ave. for Thos. Prefontaine, 4374 Western ave. Architect, Jos. Sawyer, 407 Guy street. 2-sty. and basement, brick construction. Work started.

Windsor, Ont.

Apartments to cost $25,000, Outlette street, for Frank Hutton. Plans prepared at once.

Winnipeg, Man.

Apartments, River avenue, for Col. H. W. A. Chambre. Architect, William Bruce, 222 McDermot avenue. 3-sty. and basement, brick and stone construction. Plans prepared.

CONTRACTS AWARDED

Brockville, Ont.

Two residences, cost $6,000, for J. Ridgeway. General contractor, Alex. Millar. Two and a half storeys, 50 x 35, brick construction.

Calgary, Alta.

Four residences to cost $10,000, Bankview, for Dr. Buch, 524 14th avenue west. General contractor, D. J. McKay, 934 12th ave. west. 1-sty., 22 x 40, frame construction.

Two residences to cost $5,000. Owner and contractor, R. Perch, 1512 26th ave. west. 2-sty., 20 x 32, frame construction.

Residence to cost $5,000, Mt. Royal. Owner and contractor, J. A. Knaepfle, 504 McLean Block. 2-sty., 30 x 32, frame construction. Plans ready.

Residence to cost $4,000, Upper Hillhurst, for T. Berbridge, 707 Hope street. General contractor, P. M. Dewar, 626 Third ave. west. 2-sty., 26 x 30.

Three residences to cost $7,500, Mission street, for A. F. Hickey, Calgary. General contractor, J. H. Henderson, Board of Trade Bldg., Calgary. Frame construction.

Residence to cost $5,000 for W. M. Dawson, Glencoe street, Calgary. General contractor, H. Church, 739 14th ave. west. 2-sty., 28 x 42, frame construction.

Two residences to cost $8,000, Glencoe street, for J. Howard, 1124 17th avenue west. General contractor, Consolidated Estate & Building Co., 1124 17th avenue west. 2-sty., 27 x 37, brick veneer construction.

Residence to cost $4,000, Mission st., for Therese Contuie, 321 20th avenue w. General contractor, Despine Bros., 1934 8th avenue east.

Residence to cost $4,000, Royal Sunalta. Owner and contractor, W. H. McDonald, 319 74th avenue west. 2-sty., 20 x 38, frame construction.

Hamilton, Ont.

Residence, cost $4,000, Buelah ave., for E. W. Squires, 132 John street. Architects, general contractors and carpenters, Giles & Beck, 152 May street. Mason, Chas. Kidd, 398 Barton street east. Cement contractor, R. J. Ford, 49 Melbourne street. Heating, Bloom & Brittain, 123 James street. Tinsmith, H. J. Wise, 105 Oak ave. Stone work, C. Kidd. Sewer, J. J. Armstrong, 138 Erie ave. Two storeys, 23 x 34, brick and stone construction.

Montreal, Que.

Residence, cost $11,000, Sherbrooke St., for Mr. Dionne, 581 St. Catherine St. Architect, Jos. Sawyer, 407 Guy street. Mason, Desjardins & Gelinas, 667 Bourbonnieve street. Painting and glazing, J. Guy, 325 Workman street. Plumbing and heating, T. Lessard & Sons, 191 Craig street east. Electric Wiring, St. Amour, 1181 Huntly street. Two stys. and basement, 22 x 63, brick construction.

Flats, cost $5,000, 371 Laurier ave., for Leon Chevalier, 411 Clarke street. Architect, Jos. Sawyer, 407 Guy street. Contractor, A. Labouliere, 71 Edward street. Three storeys, 33 x 45, brick construction.

Flats, cost $3,000, for Emile Lamarche, 153 Dumas street. Contractor, Z. Legault, Jarry street. Three storeys, brick, 25 x 30.

Apartments to cost $75,000, Berthelet street, for J. S. Evans, Bank of Ottawa Bldg. Architect, Finley & Spence, Beaver Hall Hill. General contractor, Bishop Construction Co., E. T. Bank Bldg. Granite, Laurentian Granite Co., 224 St. James street. Plumbing and htg., T. O'Connell, 183 Ottawa. Mill work, V. E. Traversy, 15 Josephat Lane. Painting, glazing and decorating, E. Gross, 100 Inspector street.

Flats to cost $3,500, Darling street. Owner and general contractor, Jno. Mathieu, 206 Nicolet street. 3-sty., 30 x 40.

Residence, corner Nelson and Strathearn, for Howard Murray. Architect, Peden & McLaren, 20 St. Alexis street. General contractor, J. J. Kirkpatrick, 20 William street. Plumbing, Tom Bain, 155 Guy street. 2-sty., 15 x 15, brick construction.

Three flats to cost $5,000. Cartier Park, for F. Tremblay, Guy and William streets. Architect, R. Charbonneau, 15 St. James street. General contractor, A. Laplante, Lachine, Que. 3-sty., 30 x 90.

Residence to cost $10,950, St. Hubert street, for J. G. Mousseau, 333 Mt. Royal avenue. Architect, Gauthier & Daoust, 180 St. James street. Contractor, F. Langevin, 1097 Delormier street. 2-sty., 34 x 41, stone and brick construction.

Residence to cost $35,000, 68 Ontario street, for G. W. McDougall, 607 Quebec Bank Bldg. Architect, R. Findlay, 10 Phillips Place. Mason and brickwork, J. Stewart & Co., Bethune street. Carpentry, Geo. Roberts, 79 Lagauchetiere street. Painting and glazing, Henry Morgan & Co., 1 Beaver Hall Hill. Plumbing and heating, M. J. Quigley, 4228 St. Catherine street. 3-sty., 40 x 54.

Flats to cost $3,300, 2557 Esplanade avenue. Owner and builder, J. D. Desparois, 2557 Esplanade ave. 3-sty., 18 x 65.

Flats to cost $5,200, 36 Fabre street, for R. Beauchamp, 24 Boyer street. Builder, A. A. Maurice, 2229 St. Urbain street. 3-sty., 25 x 40, brick veneer construction.

Flats to cost $5,000, Mitcheson street. Owner and builder, G. Bail, 102 Stadacona street. 3-sty., 28 x 46, brick construction.

Flats to cost $35,000. Owner and general contractor, A. Giguere, 2940 Park Lafontaine. Architect, R. Charbonneau, 15 St. James street. 2-sty., 50 x 100, stone and brick.

Residence to cost $15,000, Pine ave. Owner and contractor, E. G. M. Cape, Beardmore Bldg. Architect, Saxe & Archibald, Beaver Hall Hill. Brick and stone construction. Work started.

Residences to cost $3,500 each, Northcliff and Marlow. Owner and contractor, S. D. Vallieries, 1431 St. Hubert st. Architect, Jos. Sawyer, 407 Guy street. 2-sty., 23 x 40, brick and stone construction.

Residence to cost $3,500, St. Denis st. Owner and contractor, E. Lalonde, 468 Huntly street. 2-sty., 25 x 130, brick construction.

Flats to cost $3,500, Maisonneuve st. Owner and builder, Victor Loiselle, 837 Demontigny street. 3-sty., 30 x 30, brick veneer construction.

Residence to cost $3,500, Waverley street. Owner and builder, Augustin Handfield, 2161 St. Urbain street. 3-sty., 25 x 39.

Flats to cost $5,000, Hutchison street, for J. H. Laing, 10 Laurier avenue W. Builder, A. Frenette, 212 Fabre street. 3-sty., 25 x 38.

Flats to cost $3,800, 72 Duquette st. Ulysse Boulianne, 632 Lafontaine street. 3-sty., 24 x 40, brick construction.

Residence to cost $3,800 for C. Hampshire, c/o General contractor Furse & Gordon, 327 St. Antoine street. Plumbing and heating, Whyte & Delaney, 38 Berthelet. Electric work, C. Lapierre, 419 Lindsay Bldg. 2-sty. and basement, 25 x 45.

Niagara-on-the-Lake, Ont.

Residence to cost $5,000, for Mr. Stockwell. Architect, A. E. Nicholson. Excavation, mason and roofing, I. Nichols. Carpentry, painting and glazing, and plumbing and heating, Gibson & Son, all of St. Catharines. 2-sty.

North Battleford, Sask.

Residence to cost $10,000, for Mayor Griece. Architect, Stephenson & Evans. Contractor, Guillot & Warnock. 1½-sty., 45 ft. 6 in. x 34 ft. 6 in., brick construction.

Ottawa, Ont.

Residence to cost $4,000, Holland st., for Geo. H. Lett, 10 Ella street. Gen. contractor, G. H. Johnston. 18 x 35.

Residence, cost $4,000, Goulberion St. Owner and general contractor, L. E.

Nadburks, 77½ Sparks street. 16 x 40, brick veneer construction.

Two detached residences, cost $8,300, Ossington ave., for V. V. Rogers, 195½ Sparks street. General contractor, W. H. Craig, 195½ Sparks street. 22 x 36, brick veneer construction.

Residence, cost $3,500, Larch street, for Wm. Tremble. Architect, Wm. Hunt, 176 Florence street, 32 x 26 ft. 5 in., brick veneer.

Two residences, cost $4,500, McLaren street. Contractor and owner, Ralph Smith, 124 Percy street. 43 x 36, brick veneer construction.

Four residences, cost $7,500, Baird St., for Gordon Law, Caledonian Foundry. General contractor, J. C. McLeod, 40 Union street. Stone and brick construction.

Residence, cost $6,000, First ave., for J. G. Davidson. General contractor, N. Hollister, 512 Bay street. 26 x 36, brick veneer construction.

Two residences to cost $4,000, Arthur street, for Mrs. E. Proin, 131½ Bell st., General contractor, Fred Hunt, Spadina ave. 35 x 39, brick veneer construction

Residence to cost $4,000, King Edward street, for Mr. Routhier. General contractor, W. H. Craig, 195½ Sparks street. 22 x 36, brick veneer construction.

Residence to cost $3,000, Renfrew st. Owner and contractor, B. Villeneuve, 164 Bayswater avenue. 24 x 36, brick veneer construction.

Three residences to cost $6,000, 1st avenue, for Misses Richmond & Noirish. General contractor, James & Ramsay, 70 Fairmont avenue. 40 x 43, brick veneer construction.

Residence to cost $6,500, McLeod st., for W. A. Halliday. General contractor, D. A. Howard, 175 Strathcona ave. 28 x 43, brick veneer construction.

Residence to cost $4,000, Regent st. Owner and contractor, L. R. Gauthier, 72 Sherwood street. 25 x 32, brick veneer construction.

Apartments to cost $6,000, Clarence street, for Osela Startland. General contractor, J. B. Davis, 272 Clarence street. 30 x 50, brick veneer.

Two residences to cost $8,000, 4th avenue. Owner and contractor, W. H. Craig, 195½ Sparks street. 24 x 36, brick veneer construction.

Residence to cost $4,000, Adeline st. Owner and contractor, Chas. Brouse, 250 Queen street. 47 x 36, brick veneer construction.

Three residences to cost $5,000, St. Patrick street, for Mrs. Catherine Kinsella. General contractor, A. J. Cameron, 26 George street. 43 x 45, brick veneer construction.

Apartments to cost $25,000, Laurier avenue, for Geo. Rogers, 285 Laurier avenue. Excavation and masonry, Geo. Grain, Clemow ave. Carpenter, Ferguson & Lamberg, Ottawa. Architect, J. A. Ewart, Sparke street.

Residence, cost $6,000, Powell ave., for J. G. Davidson. General contractor, N. Hollister, 512 Bay street. 26 x 36, brick veneer construction.

Outremont, Que.

Residence to cost $4,000. Owner and contractor, Jno. Graham, 259 Querbes street. 2-sty., 26 x 50, brick construction.

Residence to cost $12,000, St. Catherine road, for Eugene Desmarais, 287a St. Denis. Architect, J. Arthur Godin, 269 St. Denis street. 4-sty., 39 x 60, brick construction. Work started.

Residence to cost $12,000, St. Catherine road, for Eugene Desmarais, 287a St. Denis. Architect, J. Arthur Godin, 269 St. Denis. 4-sty., 39 x 60, solid brick construction. Work started.

Red Deer, Alta.

Boarding House to cost $6,000, 3rd street N.E., for T. W. Sachett. General contractor, Baird & McKenzie. 2½-sty., 48 x 46, frame construction.

Residence to cost $2,700, Highland Park, for E. Niechener. General contractor, Wm. Loveland. 1½-sty., 24 x 30, frame construction.

Residence to cost $2,500, Bank street, for G. W. McKewnie. General contractor, A. Dustan. 2-sty., 22 x 28, frame construction.

Renfrew, Ont.

Residence for Dr. A. S. Wade. Architect, M. J. O'Brien. Painting and glazing, Syd. Jennings. Plumbing and htg., Jno. Conley. 2½-sty., solid brick construction.

Toronto, Ont.

Five pair semi-detached residences to cost $15,000, Coady avenue, for H. Cranfield, 155 Robert street. Architect and builder, J. Snowden, 9 Chapel street. 32 x 41, brick and stone.

Residence to cost $4,000, 601 Carlaw avenue, for Robert J. Dixon, 18 Wroxeter avenue. Architect, F. H. Herbert, 65 Adelaide east. Builder, E. G. Switzer, 139 Springhurst avenue. 3-sty. brick.

Residence to cost $25,000, Chestnut Park road, for A. J. Gough, Louisa and Yonge streets. Architect, H. Simpson, 82 King E. Mason, Holtby Bros., 21 Robert street. Sarpentry, N. J. McLeod, 341 Carlton street. Other trades not let yet. 2-sty. and attic, brick.

Two residences to cost $3,800 each, Indian road, for J. W. Buthart, 47 Dorval road, architect and builder. 2-sty., stone and brick, shingle roofing, hot water heating.

Apartments to cost $35,000, for Alex. Park, Winchester and Metcalfe street. Architect, Henry Simpson, 82 King st. E. Mason, J. A. Wickett, 678 Broadview avenue. Carpenter, J. McKenzie, 447 Gladstone ave. 3-sty., brick. Work started.

Six pair residences to cost $12,000, Dufferin street and also Beaver avenue, for Deith & Sons, 44 Grove avenue. Architects and builders. 2½-sty., stone and brick. Work started.

Residence to cost $3,400, Kingswood road, for Jas. Nichol, 10 Windsor ave. Builder, C. J. Poole, 10 Windsor ave. 2-sty., brick.

Residence to cost $2,500, Jones ave., for Jno. Long, 572 Pape avenue. Architect, A. Moss, 125 Boultbee ave. Builder, W. Bennett, 19 Canning avenue. 2-sty. and attic, brick.

Two detached dwellings to cost $7,000, Thornton avenue. Builders, Watt & Hannah, 74 Bartlett avenue. Architect, J. W. D. Greig, King street, Weston. 25 x 45, brick.

Verdun, Que.

Six flats, cost $7,500, Bannantyne St. Owner and contractor, P. Lajoie, 514 Church street. 3-sty., 40 x 30, brick construction.

Westmount, Que.

Detached residence to cost $17,000, Kensington street, for H. E. Bydwell, 26 Linton Apartments. General contractor, Robertson Bros., 10 Chestnut avenue. 2-sty. and basement, 40 x 40, brick construction.

Residence to cost $6,000, Sherbrooke street, for A. Dionne, 581 St. Catherine street west. General contractor, Desjardins & Gelinas, 667 Bourbonnieve. 2-sty., 22 x 41, brick and stone.

Semi-detached residence to cost $14,500, Grosvenor avenue, for A. W. Adams, Somerville avenue, Ahuntsic Ward. Contractor, Norton & Moore, 4842 Sherbrooke street. 2-sty., 44 x 53, brick construction.

Residence to cost $18,000, Grosvenor avenue. Owner and contractor, S. H. Newton & Birks, 108 Crescent street. 2-sty. and basement.

Residence to cost $4,000, Belvedere st., for Howard Murray, Victoria avenue, Montreal W. Contractor, Robertson Bros., 10 Chestnut avenue. Architect, Ross & McFarlane, 1 Belmont street. 3-sty. and basement, 72 x 39, brick construction.

Winnipeg, Man.

Residence to cost $7,000, Grosvenor street, for Thos. L. O'Brien, Ft. Garry Court. Architect, H. E. Matthews. Contractor, Dunn & Wallace. 2-sty., 33 x 33, frame construction.

Residence to cost $5,500, Ethelbert street, for S. Laurie. Architect, Frank R. Evans, Somerset Blk. Contractor, H. McKinney, 589 Bannatyne avenue. 2½-sty., 30 x 32, frame construction.

Business Buildings and Industrial Plants

Berlin, Ont.

Business block to cost $40,000, for L. J. Breithaupt. Property corner of King and College streets purchased, as suitable site.

Calgary, Alta.

Business block for Dr. Blow, Board of Trade Bldg. Architects and engineers, Alberta Engineering Co. 6-sty., brick and steel construction. Plans under way.

Building to cost $6,000, 6th avenue and 4th st., for Joe. Ltd., 1st st. west. Architect, Jones & Little, Calgary. 1-sty., 125 x 50, solid brick construction. Plans under way.

Fort William, Ont.

Bank to cost [illegible] May [illegible] Victoria avenue, for Union Bank. Architect, Carl Wirth, Ft. William. 4-sty., 25 x 100. Plans being prepared.

London, Ont.

Factory to cost $25,000, for Electrical Specialties Co., London. Manager, W. Fowler, London. 2-sty., 150 x 50. Plans under consideration. Complete new electrical machinery required.

Medicine Hat, Alta.

Bank Building to cost [illegible], for [illegible] Bank of Canada. Tenders received by Architect W. T. Williams after May 24th. 3-sty., 25 x 60

Montreal, Que.

[illegible] and light manufacturing building to cost [illegible] and Duluth, for H. Levy & Sons, 198 Metcalfe street. Architects, Dufort & Decary, La Patrie Bldg. Tenders received after May [illegible], until June 3rd. 4-sty., 84 x 82, brick and terra cotta.

Office building, Victoria street, for J. H. Millen, Guardian Bldg. 84 x 97. Plans under consideration.

New Hamburg, Ont.

Store to cost $6,000, for Theodore [illegible], New Hamburg. 2-sty., 22 x 38, brick construction. Foundation started.

Niagara Falls, Ont.

Bank building for Canadian Bank of Commerce, Toronto. Plans in preparation.

Owen Sound, Ont.

Iron works extension for Corbet Foundry Co. 1-sty., 75 x 50, concrete and steel construction. Plans considered.

Port Colborne, Ont.

Smelter for the Canadian Union Furnace Company, Limited. Subsidiary Co. of Buffalo Union Furnace Co., 51 Hamburg street, Buffalo, N.Y. Plans ready. New equipment required. Work will start immediately.

Renfrew, Ont.

Mill extensions for Renfrew Woollen Mills Ltd. 3-sty., 42 x 80, brick construction. Machinery required. Plans in preparation.

St. Catharines, Ont.

Warehouse, Hellewill street, for Jas. E. McCauten, William street. One sty., 24 x 50, cement block construction. Excavation started.

Saskatoon, Sask.

Dairy building for Saskatoon Pure Milk Co., Ltd. Architects, Edwards & Saunders, 18 Toronto street. One sty., 42 x 68, brick, reinforced concrete. Tenders open.

Toronto, Ont.

Stable and garage to cost $3,500, S.S. St. Clair avenue, for Capt. A. E. Kirkpatrick, 6 Colborne street. Architect, Eden Smith & Son, 199 Yonge street. Builder, Thomas Bros., 402 Dupont st. 1-sty. and attic, brick construction. Tenders open for all trades but masonry.

Office building to cost $100,000, Richmond street, for Methodist Book Room, 33 Richmond street west. Architect, Burke, Horwood & White, 28 Toronto street. Plans prepared.

Warehouse and garage to cost $6,000, Croft street, for Ed. Rush, 97 Lippincott street, builder. Architect, H. G. Paull, 1,359 College street. 2-sty., 100 x 50, brick construction. Tenders called shortly.

Two stores to cost $6,000, for N. Samuels, 910 Queen E. Architect, P. H. Finney, 79 Adelaide E. 2-sty., 60 x 20, brick construction. Tenders open.

Winnipeg, Man.

Offices and stores, Garry and Ellice streets, for an Eastern Syndicate. Representative, G. W. Head. Architect, Ross & McFarlane, Union Bank Bldg. 12-sty., 50 x 120, modern fireproof construction. Plans being prepared.

CONTRACTS AWARDED

Cayuga, Ont.

Hotel to cost $15,000, Talbot street, for M. J. Rebbetoy. Mason, Edward Hannah. Carpenter, Henry Jack. Painting and glazing, W. H. Wild. Plumbing, heating and roofing, Baird Bros. 2-sty., brick construction.

Business block to cost $7,000, for W. J. Rebbetoy. General contractor, S. H. Starnaman. Work on removing old buildings to start at once. 2-sty., 30 x 45, brick construction.

Chatham, Ont.

Warehouse to cost $4,000, for Canadian Canning Co., Hamilton. General contractor, Wm. Robertson, Chatham. 2-sty., 40 x 150.

Hamilton, Ont.

Extension to factory for Canadian Drawn Steel Co., H. J. Waddie, manager. Masonry, G. E. Mills, King st. E. Carpentry, Stewart Bros., Aberdeen avenue. Painting and glazing, Goodale & Laidlaw, 20 Hunter street E. Galvanized iron, J. E. Riddell, King street East. Drains, J. J. Armstrong, 48 Burris street. Structural steel, Hamilton Bridge Works. 1-sty., 35 x 70. Architect, Stewart McPhie, Bank of Hamilton Bldg.

Addition to factory to cost $5,000, for Can. Meter Co., Caroline street N. Manager, J. B. McNary. Architect, S. McPhie, Bk. of Hamilton. Masonry, G. Mills, King street east. Carpentry, Stewart Bros., Aberdeen ave. Ptg. and glazing, Goodale & Laidlaw, 20 Hunter street E. Electric wiring, Electric Supply Co., James street S. Drains, J. Armstrong, 48 Burris street. Hoist, Otis Elevator Co.

Store and apartments, Barton street, for J. B. Gay, stationer, King street E. Architect, Mills & Hutton, Bank of Hamilton Bldg. General contractor, E. S. Kerr, Garth street. 3-sty., stone and brick construction.

Factory extensions, cost $12,000, for Canadian Shovel & Tool Company, Imperial street. Architect, Stewart McPhie, Bank of Hamilton Bldg. General Superintendent, F. Skelton. Masonry, Geo. E. Mills, King street. Carpentry, W. H. Leedham, 81 George street. Painting and glazing, Sam Marriott, 28 Rebecca street. Iron work, E. Riddell, King street east. Drains, J. J. Armstrong, 48 Burris street. Structural steel, Hamilton Bridge Works.

Medicine Hat, Alta.

Business block to cost $100,000, for W. R. Hull, Calgary. Architect, F. J. Lawson, Calgary. General contractor, Oakes & Everard, Medicine Hat. 3-sty., 125 x 130, brick and stone.

Montreal, Que.

Stables to cost $66,000, Craig and Delorimier streets, for Molsons Brewery Co., Notre Dame street E. Architect, E. F. Hettinger, 906 Notre Dame street. General contractor, E. G. M. Cape. Beardmore Bldg. Stable fittings, Warden King Co., Maisonneuve. Steel work, Dominion Bridge Co., Lachine. Millwork, F. Tremblay & Co., 400 William street. Cut stone, A. Gauthier, St. Hubert street and Laurier avenue E. Iron work, Can. Arch. Iron Works, 74 St. Dominique street. 3-sty., 260 x 75.

Extension to factory to cost $7,885, Poupart street, for Columbus Rubber Co., Ltd., 146 Iberville street. General contractor, A. Lavalle, 27 Breboeuf st. 1-sty., 120 x 45, brick construction.

Store and dwelling additions, cost $3,000, 237 St. Catherine street west, for F. W. Gross, 407 St. Catherine St. W. General contractors, Simpson & Peel, Benoit street. Masonry, James Morison, 207 Guy. Architects, House of Brown, 207 St. James street. Two stys., 26 x 48, brick and stone.

Paradise, N.S.

Fruit house to cost $4,000, for L. Pearson. General contractor, J. A. Brown Sons & Lowell, Lawrencetown, Anna Co., N.S. 100 x 52, brick and stone.

Queenstown, Ont.

Canning factory for Sanitary Packing Co., Toronto. Architect, Chas. Borter, Niagara Falls. General contractor, Smith & Son, Niagara Falls. Frame construction. Work started.

Montreal, Que.

Extension to bank to cost $5,000, Angus C.P.R. shops, for Bank of Montreal, Hochelaga Branch. Architect, Peden & McLaren, 20 St. Alexsis street. General contractor, J. Allen, 300 Atwater ave. Brick construction.

Stable to cost $3,000, 206 Chatham st., for Robert Millar, 168 St. Maurice st. Contractor, W. Atchison. 2-sty., 49 x 16, brick construction. Excavation started.

St. Catharines, Ont.

Stores and dwellings to cost $7,600 for Mr. Denovo. Architect, W. H. Wiley, St. Catharines. General contractor, Newman Bros. Electrical contract not let yet. 2-sty., 44½ x 64. Old building will be demolished.

Victoria, B.C.

Office building for B. C. Permanent Loan Co. General contractor, Norton Griffiths Steel Construction Co., Vancouver, B.C. 10-sty., steel and brick construction.

Westmount, Que.

Garage to cost $5,900, Grosvenor ave., for C. H. Nelson, 471 Cote road. Gen. contractor, D. H. Scott & Co., 163 Grey avenue. 2-sty., 27 x 27, brick construction.

Power Plants, Electricity and Telephones

Weyburn, Sask.

Lighting system. Electrical Superintendent, G. V. Reid. Estimates being prepared for 25 metal standards and cluster lights with necessary equipment.

Miscellaneous

Aylmer, Que.

Addition to Methodist Church to cost $6,000. Architect, M. C. Edey, 71½ Sparks street, Ottawa, Ont. General contractor, Routley & Black, Hull, Que. Stone construction.

Residence to cost $7,000, for Dr. Hudson. Architect, M. C. Edey, 71½ Sparks street, Ottawa. Brick veneer construction. Tenders open.

Hamilton, Ont.

Pump house to cost $12,000. Mayor, Geo. H. Lees. Architect, W. A. Edwards, 2 Hughson street S. Plans being prepared.

Montreal, Que.

Remodelling grocery warehouse for A. Adelstein, 5 Place Royal, Montreal. Architect, Dufort & Decary, La Patrie

Bldg. 4-sty., 25 x 40, heavy mill construction. Plans changed, new tenders called.

Ottawa, Ont.

Factory. Owner and general contractor, J. R. Shaw, 242 Besseser. 33 x 50. Plans ready.

Residence to cost $5,500, Powell ave., for Mrs. S. Borbridge. Architect, C. Burritt, Sparks Chambers. General contractor, T. C. James, 140 Flora ave. 28 x 37.

Apartments to cost $9,500, Frank st., for T. J. McLaughlin. Architect, J. A. Ewart, Sparks Chambers. General contractor, Doran & Delvin, Box 532 City P.O. 45 x 29, brick veneer construction.

Alterations and additions to shops to cost $3,000, Elgin street, for J. E. Cole, Westboro, Ont. General contractor, Alex. Christie, Ottawa. Brick construction.

Residence to cost $5,000, Cameron st., for T. D. Rankin, O' Connor street. General contractor, Geo. Eaman & Sons. 23 x 34, solid brick and stucco.

Garage to cost $9,000, Wilbrod street, for A. W. Flack. Architect, J. W. H. Watts, Central Chambers. General contractor, Mr. Garoock. 28 x 50, stone and brick construction.

Toronto, Ont.

The Engineers' Club have acquired property on Richmond street adjoining the Penny Bank cor. Richmond and York streets and plan to erect an up-to-date club building. Mr. Willis Chipman, President.

One pair residences to cost $5,200, Dixon avenue, for W. S. Langdon, 870 Queen street west, architect and builder. 3-sty., 40 x 42, brick and stone. Tenders open for all trades but carpentry and masonry.

Bank, Gerrard and Greenwood, for Union Bank of Canada. Architect, H. Bryan Gilbert, 47 Wellington East. 2-sty., 30 x 42. Plans in preparation.

Westboro, Ont.

Residence to cost $5,000, for Wm. Henry, Architect, M. C. Edey, 71½ Sparks St., Ottawa. Solid brick construction. Plans in preparation.

Weyburn, Sask.

Business block, Fourth street, for Jos. Mergens. 2-sty., 60 x 100. Plans in preparation

Weston, Ont.

Sewage system and filtration plant. By-law carried to provide for an expenditure of $96,000

Carnegie library. By-law carried to provide $2,000 for suitable site.

Building Permits

Recent permits include the following:

Toronto, Ont.

E. B. Varey, 2-sty. and attic brick dwelling near Nina, on Lyndhurst, $7,000

Tickner & Sutherland, 2 pair semi-detached 2½-sty. brick dwelling, near Logan, on Gancork, $10,000.

A. O. Hurst, 2-sty. brick dwelling, on N.E. corner Oriole and Heath, $8,500.

A. N. Garrett, 3-sty. brick apartments on N.E. corner Howard and Glen road, $20,000.

B. Forbes, 2 pair semi-detached and 1 detached 2-sty. and attic brick dwellings near Bloomfield, on Greenwood, $10,000.

W. J. Whaley, 2 detached 2½-sty. brick dwellings, near Oriole, on W.S. Duggan, $5,600.

Bond & Smith, 2-sty. and attic brick dwelling, near Glen road, on St. Andrews Gardens, $9,000.

Rae, Lynch & Co., 2½-storey brick dwelling, near Glen road, on S.S. St. Clair Gardens, $6,500.

Dr. E. J. Rushbrook, 2-sty. brick dwelling, near Dovercourt, on College, $5,500.

J. Walkey, 2 pair semi-detached and 1 detached 2-sty. brick stores and dwelling on N.E. corner Shaw and Pendrith, $12,000.

J. P. Hynes, 2-sty. brick dwelling, near McKenzie, on S.S. Castle Frank Crescent, $8,000.

W. G. & J. Bell, 3 attached 2-sty. and attic brick dwelling, near Yonge, on N.S. Balmoral, $8,000.

A. J. Savage, 2½-sty. brick dwelling, near Glen road, on E. S. Roxboro, $6,500.

G. H. & F. C. Parsons, 1 pair semi-detached 2-sty. brick dwellings, near Broadview, on Bain, $9,000.

Dr. Gallanough, 3-sty. brick garage, near Bloor, on Brunswick, $25,000.

J. M. Cowan (in trust), 4 attached 2-sty. brick dwellings, on 56-60 Alcorn, $10,000.

Dr. Bartlan, 2 rows 3 attached brick dwellings, near Davenport, on Dovercourt, $10,400.

E. W. Turner, 2-sty. brick dwelling, near St. Clair, on E.S. Parkwood, $7,000.

J. Simpson, 2-sty. and attic brick dwelling, on 56 High Park Blvd., $7,500.

F. W. Doran, 2½-sty. brick dwelling, on 61 Lonsdale ave., $5,500.

E. P. Atkinson, 2-sty. and attic brick dwelling, near Sunnyside, on S.S. High Park Blvd., $6,000.

L. Harris, 3-sty., brick studio, near Reynolds, on N.S. Ellis, $9,000.

Wm. Hodgkinson, 2 rows 3 attached 2-sty. R. C. dwellings, brick fronts, on S.E. corner Jones and Doel, $11,000.

J. C. Borsh, 2-sty. brick dwelling, corner High Park and Indian road, $9,000.

R. E. McDonagh, 1 pair semi-detached 2½-sty. brick dwelling near College, on W.S. Rusholme, $6,000.

Wm. Hodgkinson, 1 pair semi-detached 2½-sty. brick dwellings, near Broadview, on N.S. Gerrard, $6,000.

Union Bank, 2-sty. brick bank, near Roncesvalles, on Queen W., $10,000.

Redmond & Beggs (in trust), 3-sty. brick apartments, on N.W. corner Spadina and Bloor, $50,000.

Redmond & Beggs (in trust), 5-sty. brick apartments, near Austin Terrace on Walmer, $50,000.

F. R. Cowan (in trust), 2-sty. brick warehouse, near George, on Brittain, $14,000.

Dallimore & Smith, 2 rows 3 attached 2-sty. R. C. dwellings, brick fronts, near Elliott, on E.S. Munro, $7,800.

J. W. Young, 2 pair semi-detached brick dwellings, near Cambridge, on N. S. Westmount, $8,000.

G. F. Shipley, 2½-sty. stone dwelling, near Lonsdale, on Russell Hill road, $18,000.

C. Bingham, 2-sty. brick dwelling near Lyndhurst, on Wells Hill avenue, $5,000.

W. M. Clark, Alteration and addition to dwelling on 28 Avenue road, $10,000.

Toronto Railway Co., 1-sty. frame bleecher, near Leuty, on Scarboro Beach Park, $5,000.

R. Jefferey, 2 pair semi-detached, 2-sty. R.C. dwellings, brick fronts, near Don Mills road, on Pretoria, $7,000.

S. J. Gee, 3-sty., brick apartments, near bloor, on E.S. Palmerston, $8,000.

H. Gingras, 3 attached 2½-sty. brick dwelling, near Argyle, on E.S. Givens street, $5,000.

W. J. Greenaway, 2-sty. brick dwelling, on S.W. corner Edna and Barrett, $5,200.

Thos. Frankish, 2 pair semi-detached 2-sty. R.C. dwellings, brick fronts, near Danforth, on Moscow, $8,000.

Wm. Moad, 2 pair semi-detached 2-sty. brick dwellings, on 1128-30-32 Dovercourt road, $6,000.

A. & A. Grant, 2½-sty. brick dwelling, on corner Logan and Woolfrey, $5,000.

Cantelor & Marks, 1 pair semi-detached 2-sty. brick dwellings, on 1541-3 Dundas street, $6,000.

J. D. Naylor, 2 detached 2-sty. and attic brick dwellings, near Bloor, on Keele, $7,000.

A. E. Hoidge, 2½-sty. brick dwellings, near Glen road, on S.S. Whitney, $7,000.

W. G. Taylor, 2-sty. and attic brick dwelling, near Yonge, on S.S. Heath, $7,000.

F. E. Gibson, 6 detached 2½-sty. brick dwellings, near Summerhill, on E.S. McLellan, $42,000.

St. Ours, P.Q.

Store and dwelling of A. A. Lamothe destroyed by fire. Loss $8,000. He will rebuild at once; stone and brick construction

Canada Lumberman
& Wood Worker
Toronto, Canada

The
Phœnix Bridge & Iron Works
MONTREAL Limited
General Steel Contractors
Large stock I Beams, Channels, Angles, Tees, Zees, and Plates always on hand.

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at any of these offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

Notice

Tenders addressed to the undersigned, for constructing three bridges, cement abutments and floors and steel beams, one 30 ft., one 16 ft. and one 7 ft. span, also a retaining wall 128 ft. long, will be received by the council of the Township of Hay, up to two o'clock on **Wednesday, the 29th of May, 1912.**

Plans and specifications may be seen and particulars obtained at the Clerk's office at Zurich, Ont.

The lowest or any tender not necessarily accepted.

FRED HESS, Sr., Clerk,
Hay Township.
Zurich, May 9th, 1912. 20-21

CITY OF TORONTO

Main Drainage Works

Sealed tenders for the supply of cast iron penstocks for the High Level Interceptor, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of **Tuesday, June 4th, 1912.**

They shall somprise one 78-inlh by 39-inch rectangular penstock, two 42-inch circular penstocks, and two 18-inch circular penstocks.

Plans, specifications, form of tender and other information may be obtained at the office of the City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control
20-21

Special Notice to Contractors

Could supply you with any quantity of relaying rails or for reinforcing concrete at a very low price, B. Shragge Iron & Metal Company, 396 Princess street, Corner King; Telephone St. John 382, Winnipeg. 11-23

CITY OF VERNON, B.C.

Tenders, in duplicate, for Electrical Equipment, will be received by D. G. Tate, City Clerk, up to Three O'Clock P.M., **June 10th, 1912,** for the delivery F.O.B. Vernon, B.C., of the following:—

1—125 K.W., Three Phase, Sixty Cycle Generator.
1—Exciter, direct connected to above.
1—Five panel Switchboard.
1—Series Tungsten or
1—Arc Lighting System.

Specifications will be on file at the following offices: Canadian Electrical News, Toronto; Contract Record, Toronto; Canadian Engineer, Montreal and Winnipeg, and Mather, Yuill & Company, Limited, Consulting Engineers, Vancouver, B.C. 20-23

NORTH BAY, ONT.

To Contractors

Bulk or separate tenders will be received for all trades, exclusive of heating and plumbing, for certain alterations and additions to the High School, North Bay. All tenders to be accompanied with a marked cheque for ten per cent. of the amount of the contract, made payable to the High School Board, and are to be in the hands of the Secretary, Miss H. A. Beattie, not later than Saturday, May 25th, 1912. Plans and specifications may be had from the office of the Architect, T. K. Burt, North Bay.

The lowest or any tender not necessarily accepted.

20-21

CITY OF SASKATOON

Garbage Incinerator

Sealed tenders, addressed to the City Commissioners, Saskatoon, and endorsed "Tender for Incinerator Plant," will be received up to twelve o'clock noon on **Tuesday, the 25th day of June, 1912,** for the complete installation (including all buildings) of a **70-ton per 24 hours** Incinerator Plant, and the operation of same for a period of three months after completion.

Contractors will tender on their own plans and specifications, and tenders must be accompanied by a marked cheque for five per cent. of amount of tender, which will be returned on the expiration of the three months operating period.

Cheques of unsuccessful bidders will be returned within two weeks of awarding of contract.

The lowest or any tender not necessarily accepted.

JAS. CLINKSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., April 26th, 1912. 19-21

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

Contractors' Attention

We have for sale 3 Ransome Concrete Mixers, Hoisting Engines and other contractors' equipment.

Write us for particulars and prices.

National Sand & Material Co., Ltd.,
20-22 Welland, Ont.

NAVAL SERVICE OF CANADA

Sale by Tender of Steamer "KESTREL"

Sealed tenders addressed to the undersigned and accompanied by a certified cheque for $500, will be received up to noon on **Wednesday, the Third day of July, 1912,** for the purchase of the Canadian Government Steamer "Kestrel," lately employed in Fishery Protection duties on the British Columbia Coast and now lying at H.M.C. Dockyard Esquimalt, B.C.

Forms of tender, conditions of sale, full particulars of the Steamer and permission to inspect her may be obtained on application from the Officer in charge, H.M.C. Dockyard, Esquimalt, B.C.

Unauthorized publication of this advertisement will not be paid for.

G. J. DESBARATS,
Deputy Minister,
Department of the Naval Service,
—22725 Ottawa, May 3rd, 1912. 20-22

Tenders for Bridges and Excavation for Canal

Tenders will be received up to **June 6th, 1912,** for the erection of two steel bridges over the Sauble River between the Townships of Sullivan and Arran. One bridge to be 40 ft., the other 60 ft. span, 16 ft. roadway and concrete floor; also for four concrete abutments for same, on pile foundations.

And also for digging a canal to deviate the Sauble River between parts of said townships.

Plans and specifications can be seen with Joseph Grant, Reeve of Tara, and August Klegis, Reeve of Sullivan, Marmion P.O. A certified bank cheque for 5 per cent. of amount, payable to the Treasurer of the County of Bruce to accompany each separate tender.

Duplicate tenders are required, one to be addressed to John Rutherford, Co. Clerk, Grey, Owen Sound, the other to P. A. Malcolmson, Co. Clerk, Bruce, Southampton.

Tenders to state what difference in price, if any, if only half the canal is dug this season.

The lowest or any tender not necessarily accepted.

JAMES WARREN,
Engineer-in-Charge.
Walkerton, May 11th, 1912. 20-21

TENDERS

Tenders wanted for the erection of a four-room brick public school building for the village of Port Colborne, Ont., in bulk or separate from the different trades. Plan may be had of the secretary of Public School Board of Port Colborne, or at the office of the architect, C. M. Borter, 102 Main street, Niagara Falls South, Ont. Tenders to close May 25th, 6 p.m. A marked cheque for 5 per cent. of the amount of the tender made payable to the secretary of the School Board to accompany the same.

The Board reserves the right to reject any or all tenders.

20-21

Water Works Improvements

Tenders wanted for the following additions to the Water Works at Berlin, Ont.:

(a) Half million gallon elevated water tower.

(b) Covered concrete reservoir 100 ft. x 200 ft., including 8,000 cubic yards excavation.

For further information apply to

WATER COMMISSIONERS,
Berlin, Ont.

22

Berlin, May 15th, 1912.

TENDERS

For Drainage Work

Stanley Township

Tenders for Drainage Work of by-law 11-1911, estimated at 30,500 cubic yards, will be received by the undersigned up to **June 8th, 1912.**

All tenderers must deposit a marked cheque for ten per cent. of their proposed contract price with their tender. Copies of by-law sent on application.

The lowest or any tender not necessarily accepted.

ROBT. J. RICHARDSON,
Clerk of Stanley Township,
Varna, Ont.

21-23

BASSANO

Tenders for Electric Generating Machinery

[illegible] to S. E. Whiting, Esq., The Bassano Electric Power and Traction Company, Bassano, Alta., will be received by the undersigned at 6 p.m. of the **third day of June, 1912,** for the delivery and erection of the following machinery and apparatus:

Section "A" [illegible]

Section "B" One [illegible]

Section "C" One Electrical Generator and [illegible]

A marked cheque for 5 per cent. of the amount of the tender shall accompany each tender.

Tenders are invited for each section separately.

Specifications may be obtained from S. E. Whiting, Esq., [illegible] Street, Winnipeg, or may be seen at the office of Norman A. Hill, 43 Victoria Street, Toronto; or, at the offices of the "Contract Record," Toronto and Montreal.

S. E. WHITING, President,
[illegible]
BOWRING & LOGAN, [illegible]
Winnipeg, Man.

21-22

Newmarket Public School

Sealed tenders (separate or in bulk) will be received by the architect up to **the evening of June 15th,** for the erection of a six-roomed public school in the Town of Newmarket.

The building will be of stone and brick with artificial stone trimmings; flat roof, plumbing, warm air heating.

Plans and specifications may be seen at the Architect's office and also at the office of Contract Record, Toronto, on and after May 25th.

The lowest or any tender not necessarily accepted.

Dr. C. H. R. CLARK,
Chairman of Board.

O. E. TENCH, Architect,
Newmarket, Ont.

CITY OF MOOSE JAW
SASK.

Tenders for Sewer Pipe and Specials

Sealed tenders marked "Tenders for Sewer Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Saturday, June 1st, 1912,** for the delivery of the following f.o.b. cars, Moose Jaw:

4-in. vitrified tile pipe, 1,200 ft.
6-in. vitrified tile pipe, 30,000 ft.
8-in. vitrified tile pipe, 32,000 ft.
10-in. vitrified tile pipe, 5,300 ft.
4-in. off 8-in. T-Y Junctions, 60 pieces.
4-in. off 10-in. T-Y Junctions, 10 pieces.
6-in. off 8-in. T-Y Junctions, 650 pieces.
6-in. off 10-in. T-Y Junctions, 75 pieces.
8-in. off 10-in. T-Y Junctions, 10 pieces.
8-in. vitrified tile channel pipe, 300 ft.
10-in. vitrified tile channel pipe, 75 ft.
8-in. Elbows, 5 pieces.

All pipes and specials must be first class. Tenderers must state time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.

Moose Jaw, Sask., May 17, 1912. 21-22

Used Equipment For Sale

Trench Machines:

1—No. 3 Municipal Trencher with caterpillar attachments. Cuts 24-72-in. wide; 24 ft. deep; 70 h.p. Steam Engine.
1—No. 0 Municipal Trencher, with caterpillar attachments. Cuts 12-36 in. wide; 10 feet deep.
1—Parsons Trencher, cuts 6 ft. wide, 20 in. deep.
3 Parsons Trenchers, cuts 5 ft. wide, 20 in. deep.
1 Buckeye Trencher, cuts to 18 in. wide, 5½ ft. deep.
[illegible] 7½ ft. deep.
1 [illegible] 8½ ft. deep.

Dinkies and Locomotives:

1—10 x 16 [illegible] months.
1—9 x 14 [illegible]
4 9 x 14 Davenports, 36 in. gauge.
1—9 x 14 [illegible]
[illegible]
7 20½ x 30 in., 6 wheel switches, 105 tons.

Several other 100 ton and heavier, standard gauge locomotives. This is only a partial list of our Trenchers and Locomotives. Complete list gladly supplied on request.

MARSH COMPANY
Old Colony Building
Chicago, Ill.

FOR SALE

Three Ransome Concrete Mixers, engine and boiler attached, 21 ft. capacity. Three 6½ x 8 direct connect Double Drum Hoisting Engines.

21 DAVID DICK & SONS, Welland, Ont.

To Contractors

Lump and separate tenders will be received until the **27th inst.,** for the several trades required in connection with additions and alterations to a building on Victoria street, near King street.

Plans and specifications can be seen and any other information obtained at the offices of the Architect, 164 Bay Street.

E. J. LENNOX, Architect.

21

City of Moose Jaw, Sask.

Tenders for Water Work Fittings

Sealed tenders, marked "Tender for Water Work Fittings," addressed to the City Commissioners, Moose Jaw, will be received up to twelve o'clock noon on **Thursday, May 30th, 1912,** for the supply of the following material F.O.B. Moose Jaw:—

300—⅝-in. Main Cocks (flange).
300—⅝-in. Curb Cocks (flange).
25—⅝-in. single unions.
25—⅝-in. double unions.
400—¾-in. cases and spindles.
25—Extra caps for ¾-in. case.
100—¾-in. Flange curb cocks.
150—¾-in. Flange main cocks.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.

Moose Jaw, Sask., May 8th, 1912. 20-21

City of Moose Jaw, Sask.

Tenders for Cast Iron Pipe and Specials

[illegible] Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Saturday, June 1st, 1912,** for the following, delivered f.o.b. cars Moose Jaw:

40 ft. 4 in. pipe Class A. weight 20 lbs. per ft.
33600 ft. 6 in. pipe Class C. weight 35.8 lbs. per ft.
2100 ft. 6 in. pipe Class C, weight 52.1 lbs. per ft.
175 3-in. offsetts, Class D.
[illegible]
[illegible]
[illegible]
[illegible] Class D.
[illegible] Class D.
8 6 in. ¼ bends, Class D.
[illegible]
20 8 in. Plugs
[illegible]

[illegible] time of delivery.

[illegible] accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
[illegible]
[illegible]

Moose Jaw, Sask., [illegible] [illegible]

Tenders Wanted

[illegible] Saturday, [illegible] Company, to [illegible] in the [illegible] plant [illegible] Company [illegible] also at the [illegible]

[illegible] to the [illegible]

[illegible]

[illegible] & CONNERY, Architects,
[illegible] [illegible] Chambers, Toronto

Department of Public Works, Ontario

To Contractors

Sealed tenders, endorsed "Tender for Foundation," addressed to the undersigned, will be received at this Department up to noon on **Saturday, the 25th of May,** for the excavation required for the foundation of the New Veterinary College to be erected on the corner of University avenue and Anderson street, Toronto.

Plans and Specifications can be seen at this Department.

An accepted bank cheque payable to the order of the Honorable J. O. Reaume, Minister of Public Works, for 5 per cent. of the amount of the tender, and the bona fide signatures and addresses of two sureties, or the bond of a Guarantee Company, approved by the Department, must accompany each tender. The Department will not be bound to accept the lowest or any tender.

By order,

H. F. McNAUGHTEN,
Secretary Public Works Department.

Toronto, 18th May, 1912.

Newspapers inserting this ad. without authority will not be paid for it.

21

Tenders for Dredging

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Dredging, Toronto Harbor, Ont.," will be received until 4.00 p.m. on **Tuesday, June 4, 1912,** for dredging required in Toronto Harbor, in the Province of Ontario.

Tenders will not be considered unless made on the forms supplied, and signed with the actual signatures of tenderers.

Combined specification and form of tender can be obtained on application to the Secretary, Department of Public Works, Ottawa. Tenders must include the towing of the plant to and from the work. Dredges and tugs not owned and registered in Canada shall not be employed in the performance of the work contracted for. Contractors must be ready to begin work within thirty days after the date they have been notified of the acceptance of their tender.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, for five per cent. (5 p.c.) of the contract price which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, May 15, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—23037. 21-22

CITY OF MOOSE JAW,
SASKATCHEWAN

Tenders for Ornamental Light Standards

Sealed tenders marked "Tenders for Lamp Standards," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Friday, June 14th, 1912,** for the supply and delivery of 50 Ornamental Light Standards suitable for Tungsten lighting.

Plans, specifications and all information may be obtained from J. D. Peters, Electrical Superintendent, Moose Jaw.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.

Moose Jaw, Sask., May 14, 1912. 21-23

CITY OF MOOSE JAW
SASK.

Tenders for Valves and Hydrants

Sealed tenders marked "Tenders for Valves and Hydrants," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Saturday, June 1st, 1912,** for the supply and delivery of the following f.o.b. cars, Moose Jaw:

75—6-in. Hydrants, 8 ft. 2 in. bury with two hose and one steamer connection.
150—6-in. gate valves with cases and spindles.
15—8-in. gate valves with cases and spindles.

Tenderers must submit a detailed drawing and specifications of the hydrants they propose to supply, and also state time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.

Moose Jaw, Sask., May 17, 1912. 21-22

The Corporation of the City of Vernon

Waterworks Contract No. 1.

Sealed tenders, endorsed "Waterworks Contract No. 1," will be received by the undersigned up to 5 o'clock p.m., **June 10, 1912,** for the supply and delivery of 17,000 feet of 4-inch cast iron pipe and 10,500 feet of 6-inch cast iron pipe. Specifications can be obtained from the City Engineer's office, City Hall, Vernon, B. C. A deposit equal to 5 per cent. of the amount bid must accompany each tender. The lowest or any tender not necessarily accepted.

21-23 D. G. TATE, City Clerk.

The Corporation of the City of Vernon

Waterworks Contract No. 2.

Sealed tenders, endorsed "Waterworks Contract No. 2," will be received by the undersigned up to 5 o'clock p.m., **June 10, 1912, for the supply** and delivery of 125 gate valves and 36 hydrants, ranging in size from 4-inch to 8-inch. Specifications can be obtained from the City Engineer's office, City Hall, Vernon, B. C. A deposit equal to 5 per cent. of the amount bid must accompany each tender. The lowest or any tender not necessarily accepted.

21-23 D. G. TATE, City Clerk.

Tenders for Pavement

Sealed tenders will be received by T. J. Moore, City Clerk, up till noon on **Thursday, June 6th, 1912,** for the excavation and concrete base and curb for a pavement on Suffolk street, containing approximately 9,000 square yards, including 2,150 lineal feet of street railway track and 4,500 feet of curb and gutter.

Further particulars may be obtained at the City Engineer's office.

The lowest or any tender not necessarily accepted.

PUBLIC WORKS COMMISSION,
JOHN KENNEDY, Chairman.

Guelph, May 20th, 1912. 21-22

Business Notes

Calgary, Alta.

Messrs. Grant Smith & Co. and McDonnell, of Vancouver, have been awarded a contract running into over $500,000 for the construction of a large reinforced concrete aqueduct, two miles in length, near Brooks, which will take the next two summers to complete.

A. S. Dawson, Chief Engineer of the C. P. R. Department of Natural Resources, reports the awarding of three large contracts in connection with the construction work in the Eastern Section of that company's Irrigation Block.

Messrs. Janse Bros. and Boomer & Hughes, of Calgary and Seattle, have been awarded a two-year contract, amounting to about $300,000, for the construction of a large number of reinforced concrete structures on the canal system in that section of the Irrigation Block lying between Bassano and Brooks and the Bow and Red Deer Rivers.

The Canada Foundry Co. have also been awarded a large contract for the supplying and erection of 30 steel bridges over the main canal system, containing about a million and a half pounds of steel, which, with masonry abutments, will provide practically permanent structures.

Work on all contracts will be commenced in the immediate future, and several hundred men, and an elaborate construction plant will be required for their completion.

Brandon, Man.

Elevators of Maple Leaf Milling Co. burned. Manager, W. L. Pick. Estimated loss $35,000. Will be rebuilt immediately.

Montreal, Que.

West End Methodist Church, Canning and Coursol streets, damaged by fire on May 3rd. Loss $10,000.

Parkhill, Ont.

Sawmill of Grieve & Leslie destroyed by fire. New building will be erected at once and new machinery will also be required.

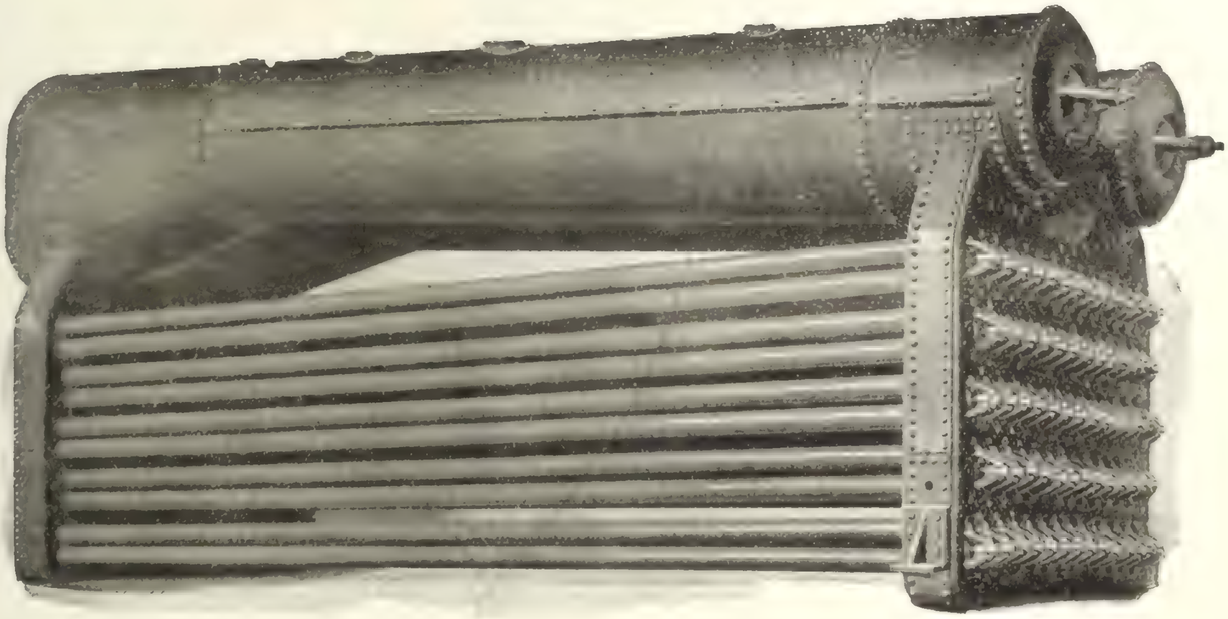
Stratford, Ont.

Factory of Tolton Manufacturing Co., with machinery, stock, &c., destroyed by fire. Loss $4,500. Repairs to be made at once.

Sherbrooke, Qne.

Rake and shovel factory of The Rugg-Ball Mfg. Co., Ltd., burned. Loss several thousand dollars.

If You Want Service Buy an Inglis Boiler



Here is a boiler that is backed with 52 years of successful practice,—a boiler that can be depended upon to give you the same service we put into it.

We know you want proved and guaranteed service not only when you buy, but in the years that are to come.

Our service extends beyond the transaction with you—its the perpetual service that's found in every Inglis boiler.

The detail of designs, the careful manufacture and skill in assembling of each and every part are minute and exact in every particular.

The work we have done for others in designing and building power plants has proven eminently satisfactory.

Get in touch with us and find out what we can do for you,

THE JOHN INGLIS COMPANY LIMITED

Engineers and Boiler Makers **Strachan Ave., TORONTO**

SEE

SMYTH & RYAN

for quotations on

Lime, Stone, Cement, Sewer Pipe, Fire Brick, Weeping Tile, Mortar Colors, Plaster, &c.

Toronto Agents for

OWEN SOUND CRUSHED STONE

Deliveries G. T. R. and C. P. R.

Head Office, 1327 Bloor Street West

Phones, June. 828,829.

Branch Yards, 53 Merton Street

Phone, North 1751 G.T.R. Belt Line

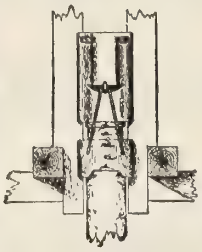
Night and Sunday calls, Phone, Parkdale, 2198.

PILE DRIVERS

VULCAN IRON WORKS CHICAGO ILL., U.S.A

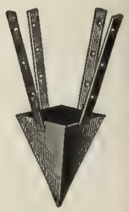
Station D

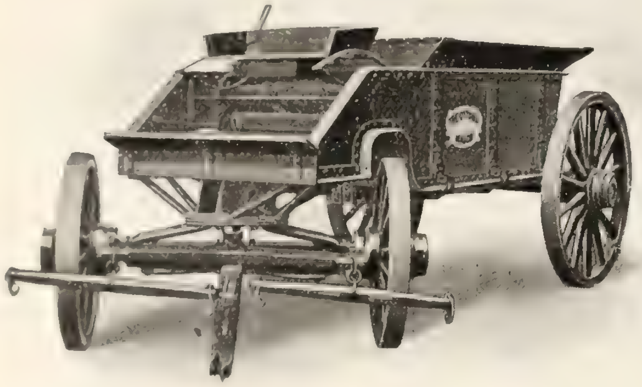
Steam Hammer

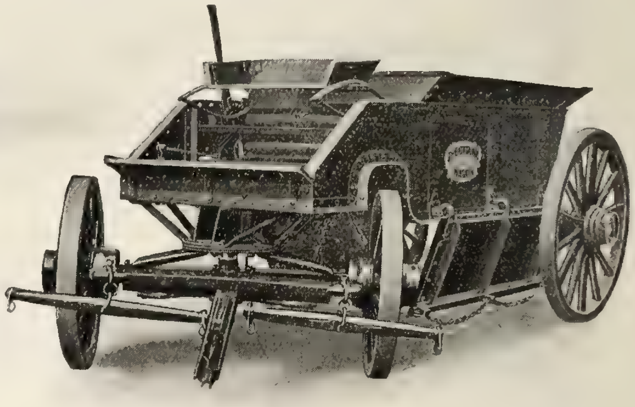


Casgrain Pile Cap

Perfect Head Block







Ottawa Steel Dump Waggons

are the latest development in Dump Waggons, and the original cost is no higher than inferior makes.

Strong, light, everlasting, first cost is last cost.

Let us demonstrate the superiority of this Dump Waggon over all others.

The General Supply Company of Canada, Ltd.

Ottawa **Toronto** **Winnipeg**

For Sale for Immediate Delivery

1—Buckeye Trench Machine, cuts trench 15 in. x 5½ ft.
1—Buckeye Trench Machine, cuts trench 28 in. x 7½ ft.
1—Buckeye Trench Machine, cuts trench 36 in. x 12 ft.
1—Parson Trench Machine, cuts trench 24 in. to 60 in. x 20 ft.
1—Municipal Trench Machine, cuts trench 24 in. to 72 in. x 20 ft.
1—26 ton Little Giant Traction Shovel.
1—45 ton Vulcan Track Shovel.
1—No. 0 Thew Full Circle Shovel.
1—No. 5 Austin Crusher with Corrugated Head and Back Gear.
1—No. 5 Gates Crusher Style "K" with smooth head in excellent condition.
1—No. 5 McCully with new head and new shaft.
1—Set of 16 in. x 36 in. McCully Rolls.

CREAM CITY EQUIPMENT COMPANY

600 Majestic Building, Milwaukee, Wis., U. S. A.

Vertical Turbine Pumps

It is frequently found necessary to locate a centrifugal pump in a pit below the floor level, in order to get within suction distance of the water supply. In cases of this kind the vertical centrifugal has been extensively used and has proved most satisfactory.

The pumps can be either belted or connected directly to vertical motors. The latter method makes an ideal pumping plant, as the motor can be located above ground where it is free from all moisture and can receive proper care. The design of the pump is such that it requires very little attention, and it is necessary for the attendant to go down into the pit only at long intervals.

4" Turbine Pump. Capacity 333 Imperial gallons or 400 U.S. gallons per minute. 94 Feet. 20 H.P. at 1,130 r.p.m.

Send for Bulletin 108.

WORKS: **WILLIAM and SEIGNEURS STREETS, MONTREAL**

**THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO. Limited**

Sales Offices: MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

WATER PURIFICATION

¶ This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
305 KENT BUILDING, TORONTO

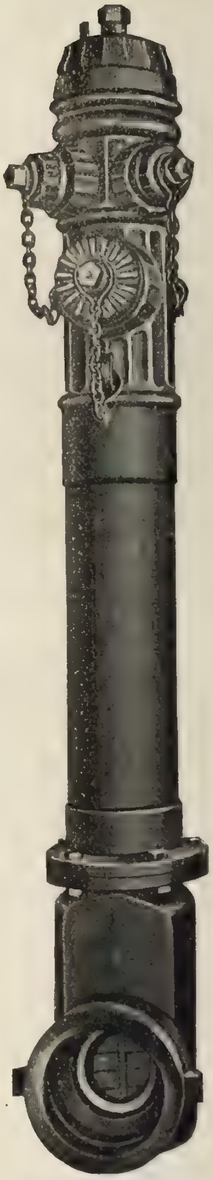
KERR

The quality and efficiency of "Kerr" valves has been tested under the most severe conditions and have "made good" every time.

"Kerr" valves and hydrants are proving their worth every hour in the day in nearly every city and town in Canada.

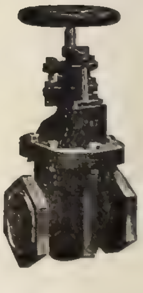
Valves are our specialty and for the best in anything you should always go to a specialist.

Always Specify "KERR"



THE KERR ENGINE CO. LIMITED
VALVE AND HYDRANT MANUFACTURERS
WALKERVILLE, ONT.

VALVES

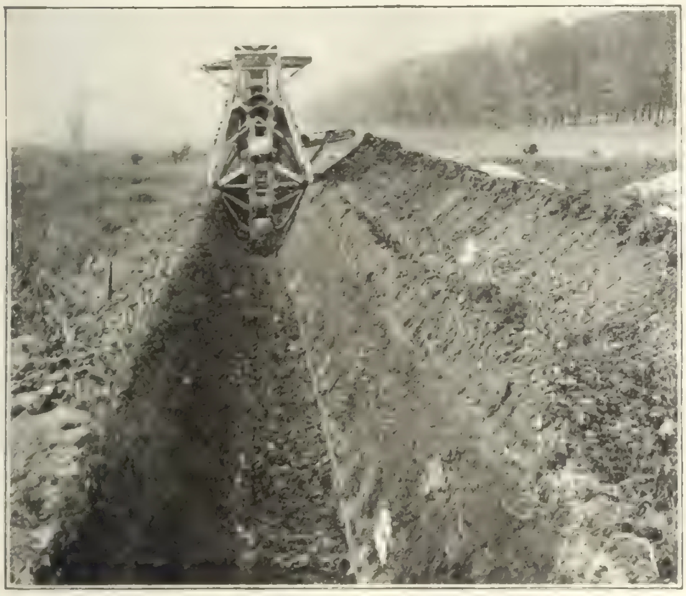


One Outfit Digs Tile Ditches and Open Ditches

If The Outfit Is An

AUSTIN TRENCH EXCAVATOR

with Bank Sloping Attachment



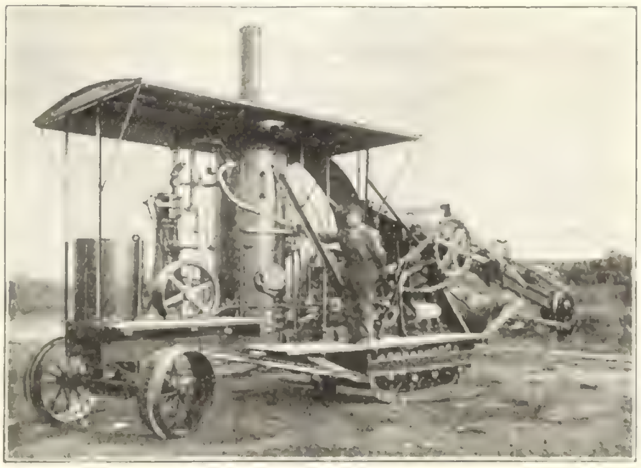
By a simple change the excavator which will dig a tile ditch or sewer trench with vertical sides, becomes an excavator for digging open ditches with sloping sides.

A ditch with sloped banks is distinctly superior to one with ragged sides; it is less liable to scour and to formation of bars; its banks do not cave into the channel; it costs less to maintain; it is more presentable; it carries more water per unit of earth removed.

The Austin Trench Machine with Bank Sloping Attachment is independent of conditions. Its all steel construction, with manganese steel working parts, equips it for trenching any material except solid rock. Its positively self-cleaning buckets equip it to dig, without clogging, the stickiest clay and gumbo. Its multipedal rolling platform tractions prevent it from miring in any ground over which a wagon can be driven.

It travels over country roads by its own power 1½ miles per hour. **It digs sloping bank ditches at a maximum rate of 9 lin. ft. per minute.** The spoil is deposited on either side of the ditch. Motive power steam or gasoline.

We specialize in ditching machinery for open ditches and pipe line work. These various machines are known to contractors as the "AUSTIN LINE" manufactured by the F. C. Austin Drainage Excavator Co., and comprise the following:



Drainage Excavator - Type A
Drainage Excavator - Type B
Levee Builder
Drag Line Excavator
Drainage Excavator - Type R
Side Hill Ditcher
Highway Ditcher
Orange Peel Ditcher
Pipe Line Excavator
Special Wheel Ditcher
Farm Tile Ditcher

AUSTIN SEWER AND WATERWORKS EXCAVATOR
AUSTIN COMBINATION SLOPING BANK or VERTICAL BANK EXCAVATOR

Ask for Catalogue No. 208.

F. C. Austin Drainage Excavator Co.

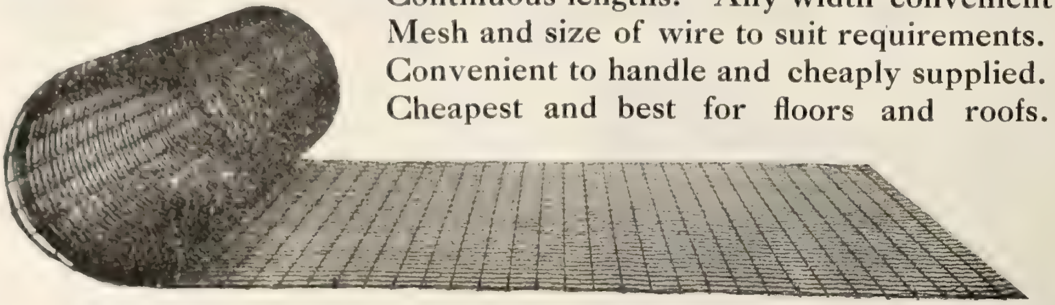
Railway Exchange, CHICAGO, ILL., U. S. A.

Represented in Eastern Canada by Lecky & Collis, Napanee, Ontario
Western Canada Agents, Canadian Equipment & Supply Co., Vancouver and Calgary
AGENTS WANTED IN OPEN TERRITORY

GREENING'S

Steel Wire Reinforcing

Continuous lengths. Any width convenient to handle.
Mesh and size of wire to suit requirements.
Convenient to handle and cheaply supplied.
Cheapest and best for floors and roofs.



WRITE FOR CATALOGUE No. 5.

Wire Rope **Wire Lath**

MANUFACTURED BY

The B. Greening Wire Co. Limited

HAMILTON, Ont. - MONTREAL, Que.

Make Your Apartments Rentable

By the Addition of

Gas Ranges and Water Heaters

When a tenant steps into a home, apartment or flat, and there finds a gas range and water heater set up ready for use in the kitchen, it makes a very favorable impression on him. The little extra cost is more than offset by the returns from a satisfied tenant. Gas water-heaters, especially, are not things to be carried from one house to another; besides conditions vary—one water-heater may not just suit the newer conditions. It pays to have

The Vulcan Gas Ranges and Water Heaters

installed. They keep a house or apartment in a much cleaner and healthier condition. Once installed there is no danger of damaged walls and staircases through careless carrying in and out of tenant's own appliances. The Vulcan goods are also made strong. Parts can be replaced easily. The Gas Company cleans the burners once every three months without extra charge (Toronto homes only). This promotes lasting satisfaction. Tenants remain, because of the increased accomodation. Let us have a talk on the matter. We can supply interesting particulars. We are at your service. Remember also, that we inspect Toronto piping contracts for you free of charge, to ensure efficiency. Act to day. Consultation free. Prices right. Terms easy.

SEE THOSE BALLS

They represent the Vulcan's efficiency.

The Consumers' Gas Company of Toronto

12-14 Adelaide Street West Phone Main 1933

REVERSIBLE

10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line **2,600 Lbs.**

On a Double Line will Lift **5,200 Lbs.**

160 Feet per Minute
80 Feet per Minute

Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

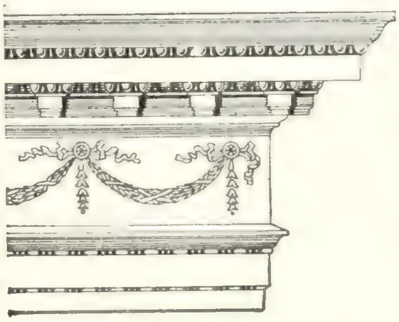
Weight with Boiler, 4,000 lbs: without Boiler, 2,400 lbs. Light enough to be moved about easily.

Length over all, 5 ft. Width over all, 5 ft. 10 in. This Engine is also made non-reversing, at a reduced price and weight. Made with One Drum or Two Drums.

Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

Galvanized Cornices



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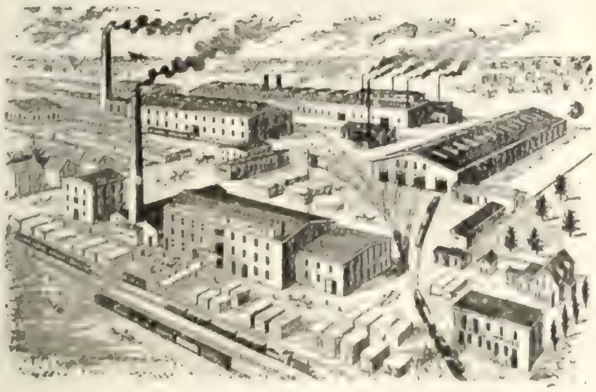

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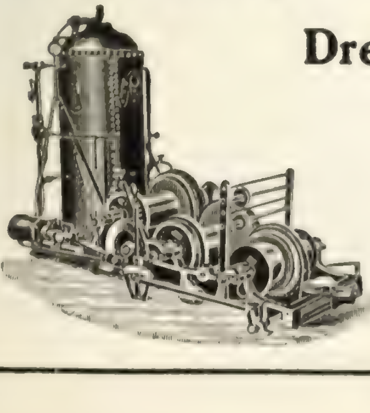

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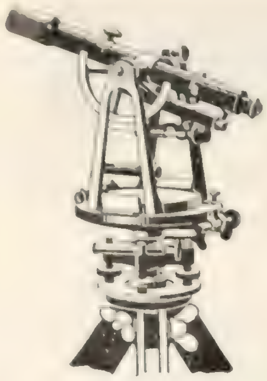

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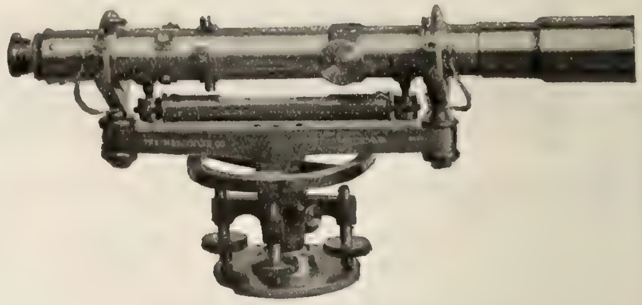

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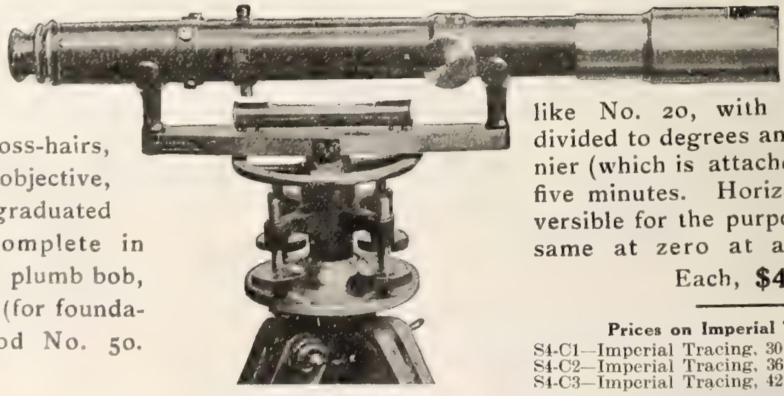

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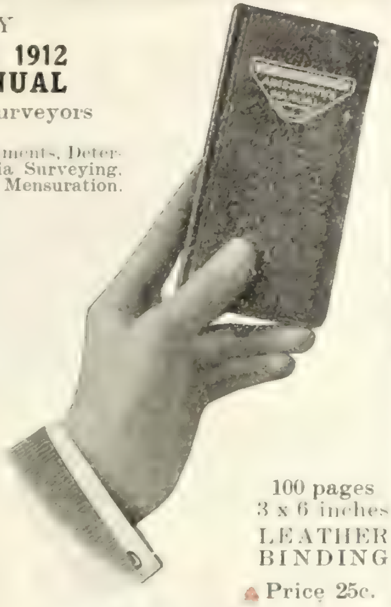

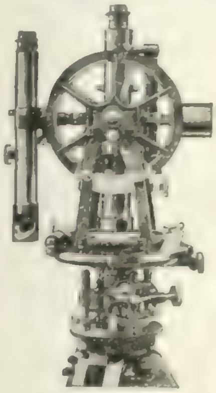

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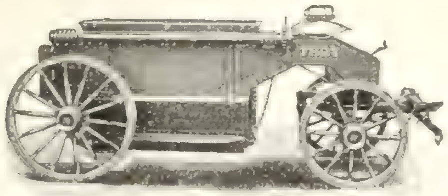

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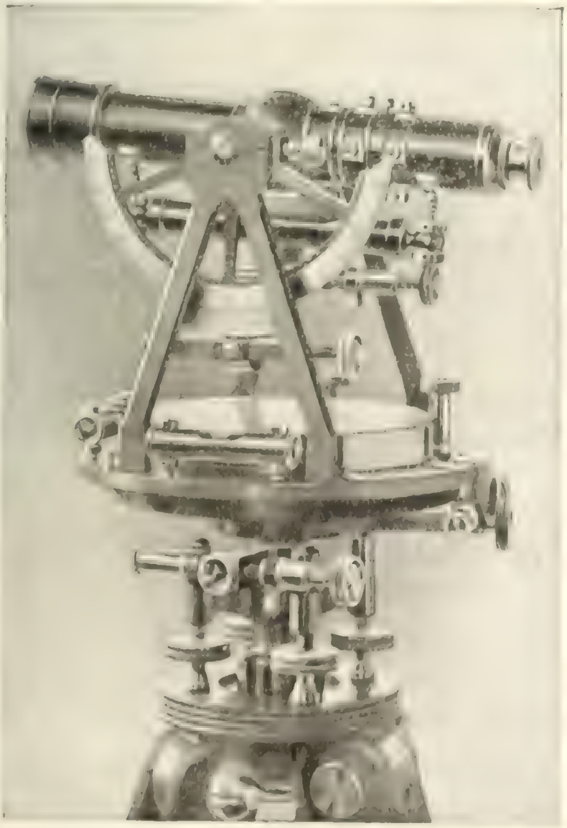

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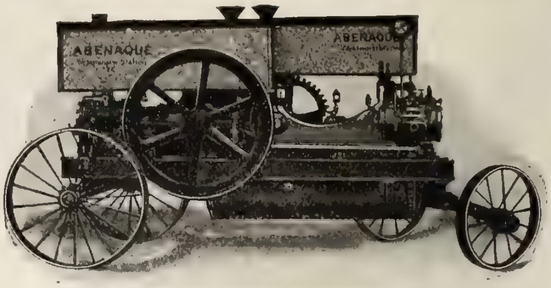

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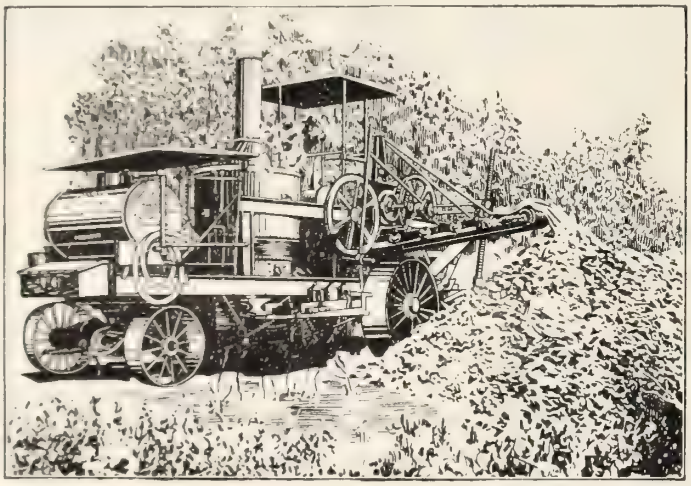

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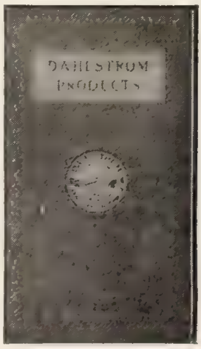

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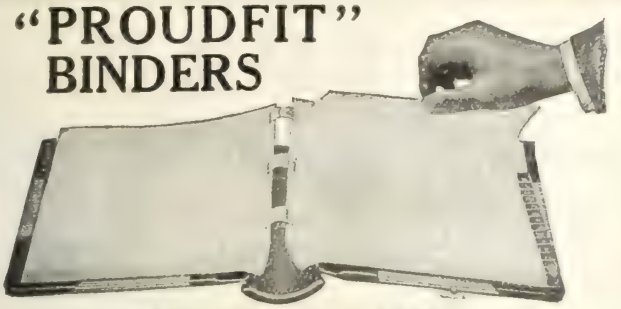

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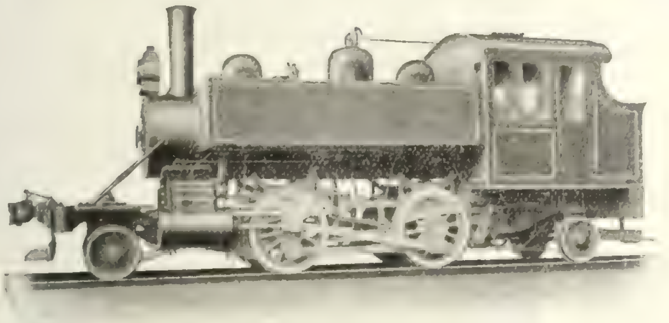

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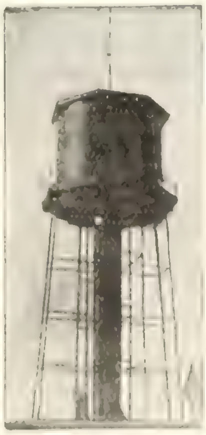

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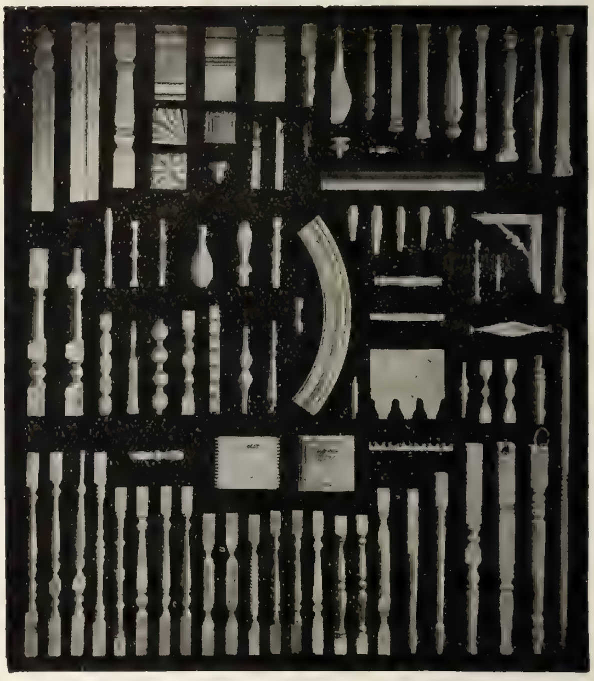

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30 gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00, 18 x 30, $1.15, 18 x 36, $1.95.

Lead Pipe

Lead pipe, 20 per cent. off; lead waste, 20 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)		Black.					Galvanized
¼ inch	....		$1.87	¼ inch	....		$2.70
⅜ "	....		1.87	⅜ "		2.70	2.57
½ "		2.47	2.35	½ "		3.40	3.23
¾ "		2.88	2.75	¾ "		4.03	3.83
1 "		4.13	3.93	1 "		5.78	5.48
1¼ "		5.63	5.35	1¼ "		7.88	7.49
1½ "		6.75	6.44	1½ "		9.45	8.98
2 "		8.46	8.05	2 "		12.06	11.46
2½ "		13.51	12.85	2½ "		19.26	18.30
3 "		17.74	16.86	3 "		25.29	24.03

Malleable Fittings—Canadian discount, 37½ per cent.
Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.
7 and 8-inch pipe, 50 per cent.
Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.
Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.
Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.45.
Binder stone, $1.30 per ton, f.o.b. Toronto.
Burnt River rubble stone delivered, $15 to $16 per toise.
Free stone delivered, $15 to $16 per toise.
Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.
Brown sills and leads, in the rough, delivered, 40 cents per foot.
Rubble Stone in car lots, $1.30 per ton.
Scotch fire brick, delivered, $30 to $35 per M.
Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.
Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.
Lime, per cwt., delivered, not less than 1,500 lbs., 38 cents.
Plaster of Paris, per barrel, delivered, $3.10.
Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $7.25 per 100 lbs.
Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.
Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.
Boiled Linseed Oil, in barrels, $1.01 per gallon of 9 lbs.
Raw Linseed Oil, in barrels, 98c. per gallon of 9 lbs.
Turpentine, in barrels, 70c. per gallon.
Pure Red Lead, dry, $6 to $7 per 100 lbs.

New Companies

V. V. Rogers, Limited, has been incorporated with a capital of $100,000, to carry on a general land and building business with head office at Ottawa, the provisional directors are V. V. Rogers, E. R. McNeill and Geo. Carss, all of Ottawa.

The Builders' Exchange, of the City of Hamilton, has been incorporated with head office at Hamilton. The provisional directors of the Corporation are Arthur Heatley, Robt. Somerville, Guy [illegible], John [illegible], [illegible] and Jas. McNeill, of Hamilton.

Electrical Contractors Supply Corporation, Limited, has been incorporated with a capital of $40,000, to carry on a general business as electricians and mechanical engineers, with head office at Toronto. The provisional directors are W. C. McNaught and C. F. Ritchie, of Toronto.

The Lewis Construction Company, Limited, has been incorporated with a capital of $40,000, to carry on a general contracting business with head office at Toronto. The provisional directors are E. C. Lewis, H. W. Middlemist and H. A. Hawley, all of Toronto.

West Toronto Realty Company, Limited, has been incorporated with a capital of $40,000, to deal in brick, lumber, cement and other building materials, the head office is at Toronto and the provisional directors are F. B. Edmunds, Hector Beattie and F. A. Urquhart, all of Toronto.

The Riordan Pulp & Paper Company, Limited, has been incorporated with a capital stock of $6,000,000, to carry on a general lumbering business in all its branches with head office at Montreal. The incorporators are L. Macfarlane, Gregor Barclay and J. G. Cartwright, all of Montreal. ,

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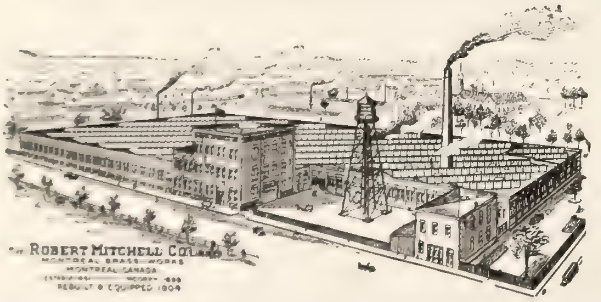

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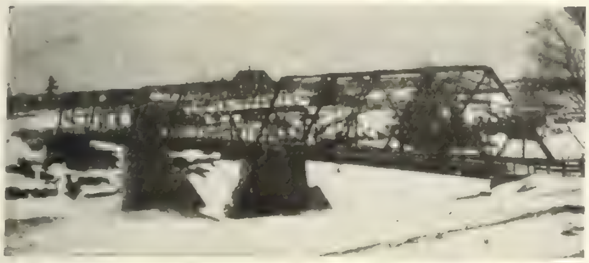

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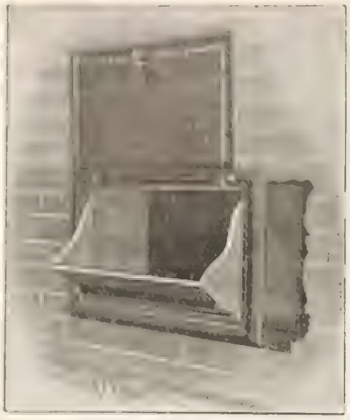

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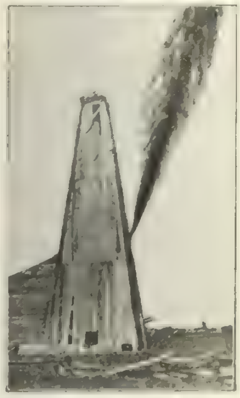
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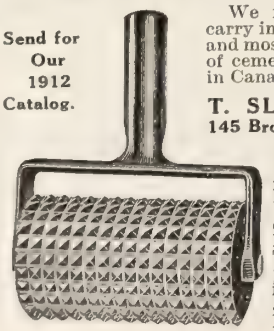

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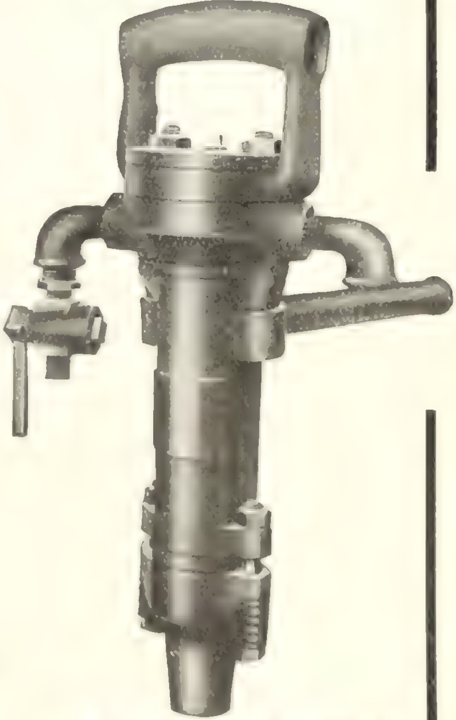

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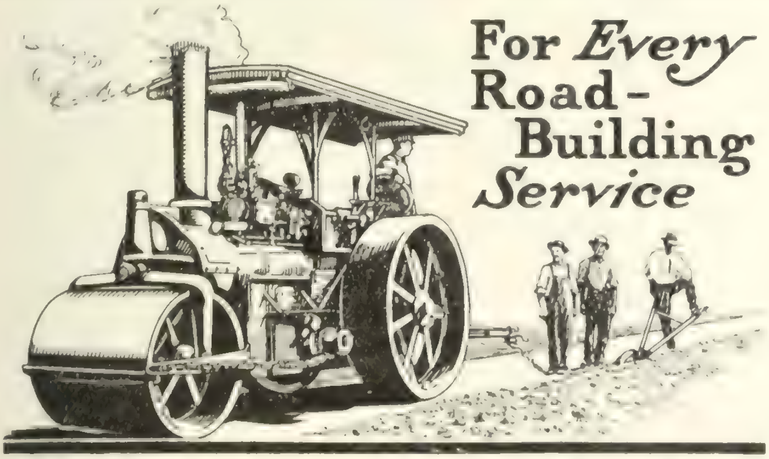

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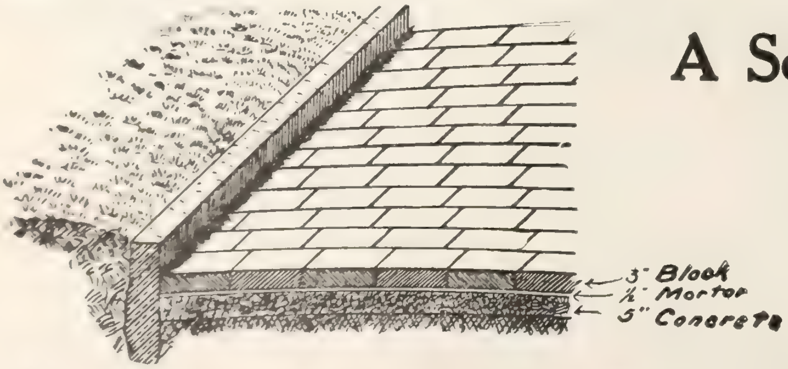

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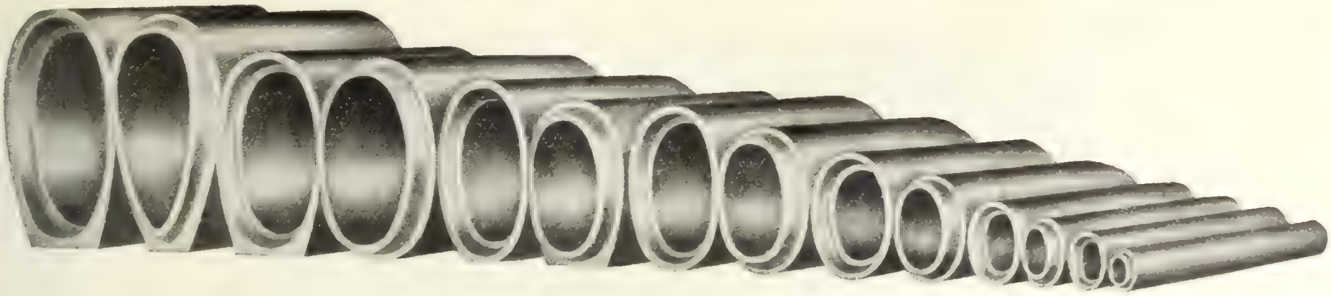

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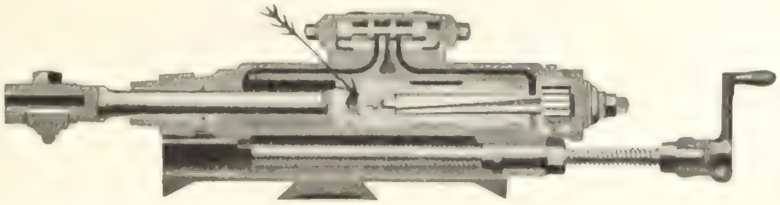

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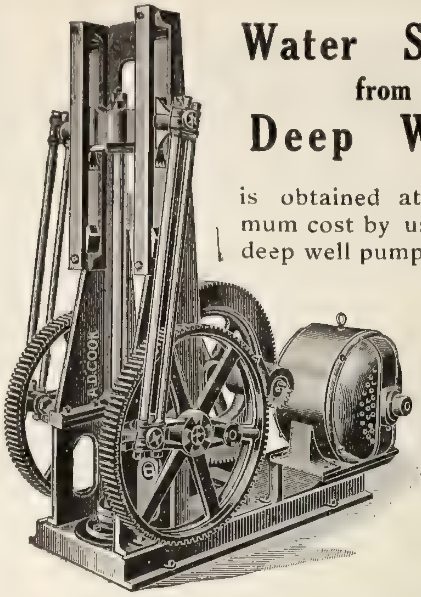

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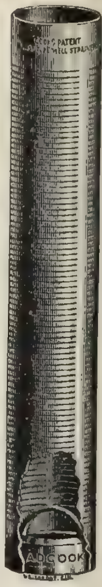

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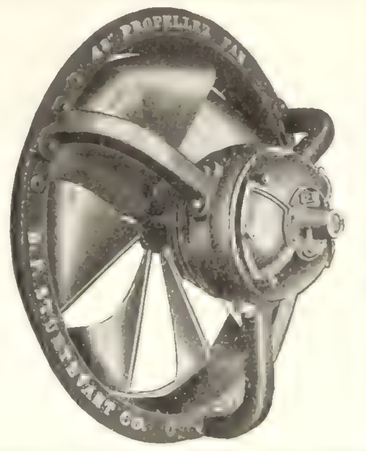

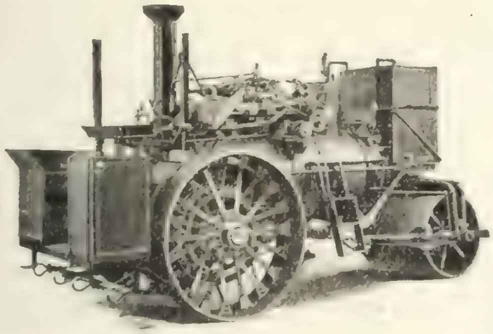

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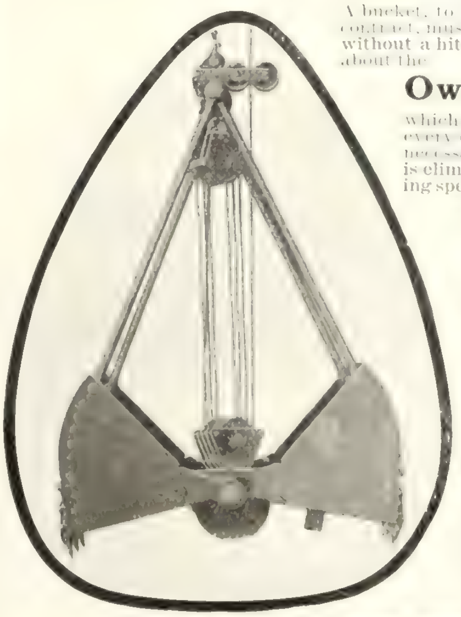

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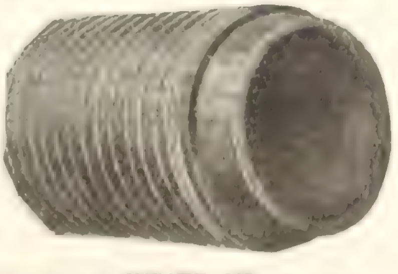

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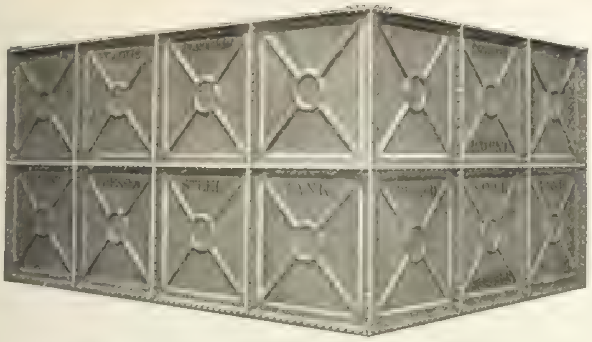

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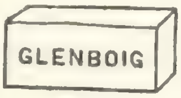

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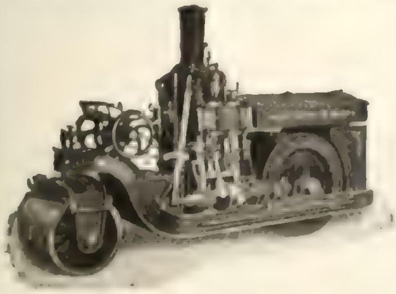

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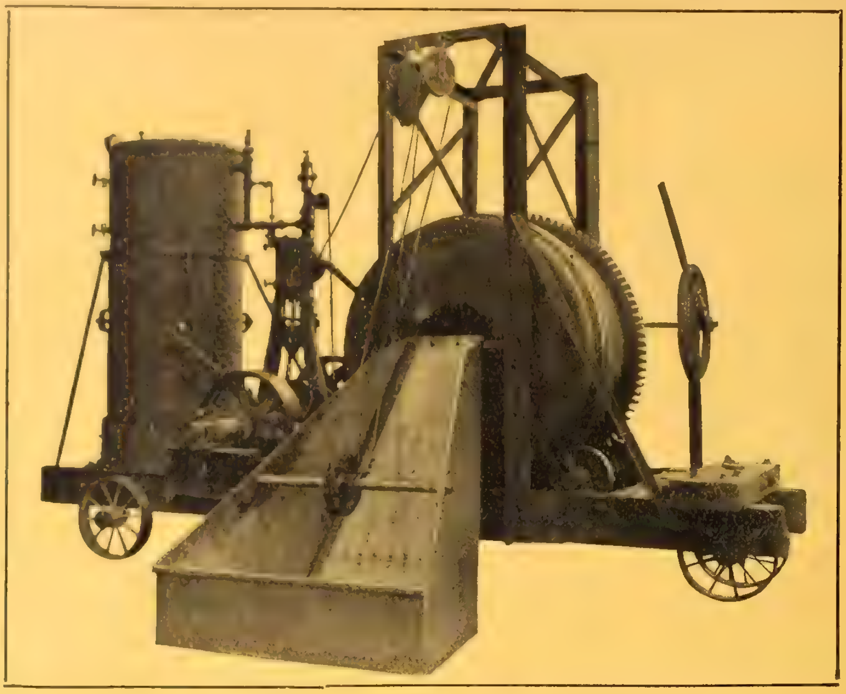

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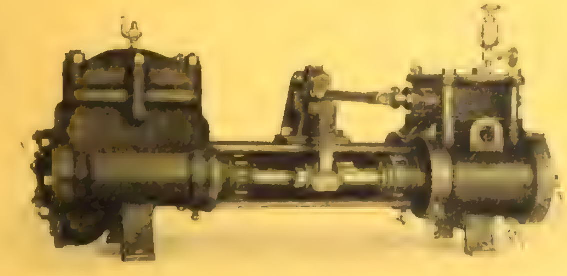

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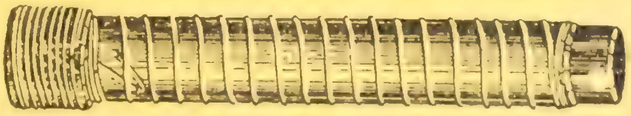

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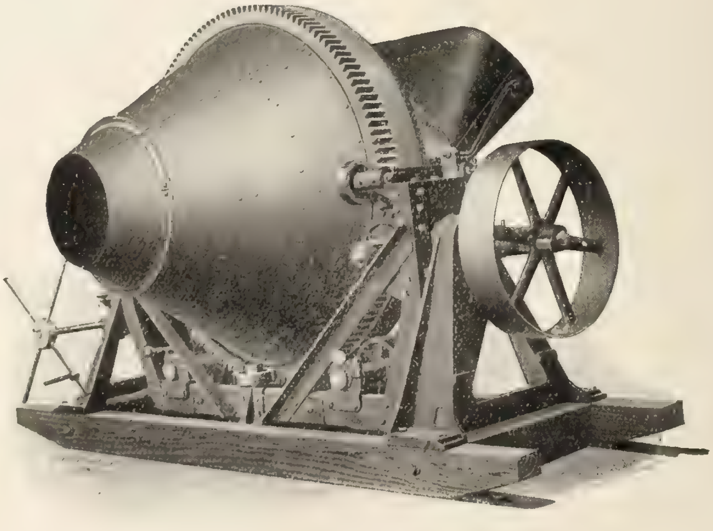

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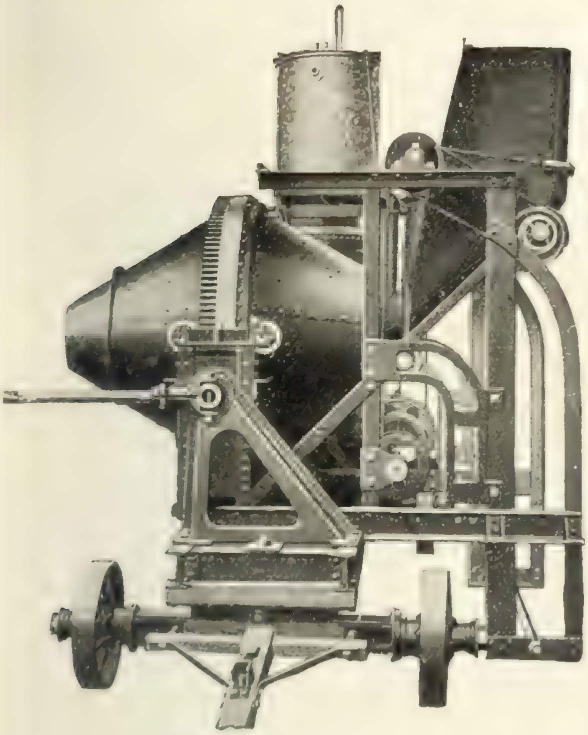
Cobalt, opp. Right of Way Mine.

MUSSENS



Smith Mixer

Our new side loader is a winner

Simple Strong Speedy

Smith Street Paver

Discharging into spreader carts

LIMITED

Winnipeg, 259-261 Stanley St.
Calgary, 121 10th Ave. East.
Vancouver, 365 Water Street

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Canadian Rand Co
[illegible] Wire Co
Canada Foundry Co.

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Architects' Levels
Watts & Son, E. R.
[illegible] & Sons, Wm

Architectural Iron Work
Canada Wire & Iron Goods Co
Dennis Wire & Iron Works
Meadows Co., Geo. B.

Architectural Terra Cotta
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Don Valley Brick Works
Northwestern Terra-Cotta Co.
Toronto Plate Glass Imp't'g Co.

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Asphalt Floors
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Leonard & Sons, E.
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McDougall Caledonian Iron Wks
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[illegible] Bridge Works
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McNeil & Co., W. P.
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Kerr Engine Co.

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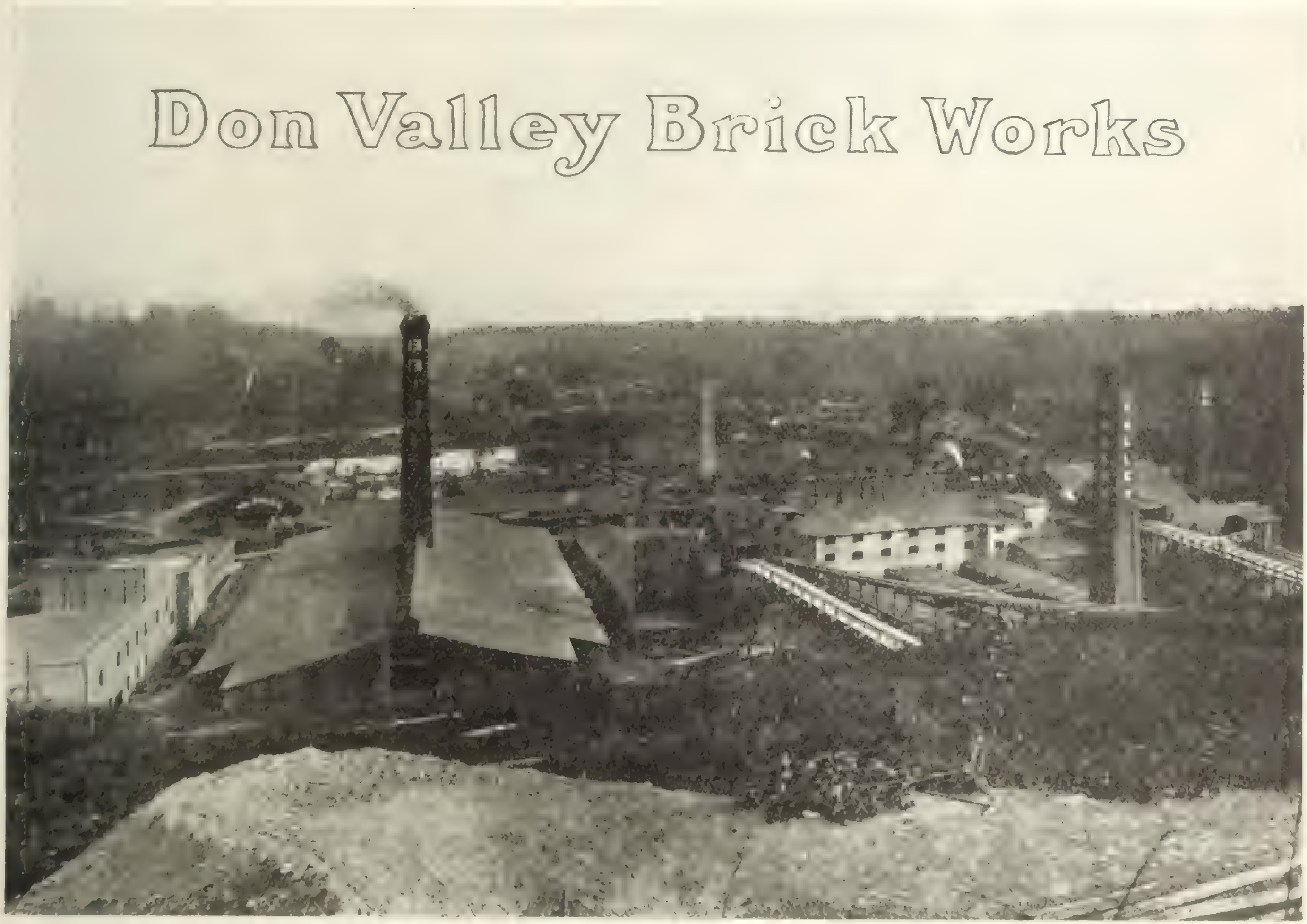
DON VALLEY BRICKS



Porous Terra-Cotta Fire Proofing

Foundation Bricks

The factor which often determines the value of a brick for structural purposes is its cheapness, but there are three considerations which are of infinitely greater importance, viz., durability, strength and beauty.

Don Valley Bricks

are produced on the most scientific lines and are renowned for their unusual strength which makes them adaptable to conditions where they are exposed to mechanical violence or unusual wear. *Don Valley Bricks* have been put to the test in hundreds of buildings, and the question of endurance under the action of weather and other forces leaves not a shadow of doubt as to their durability. Their beauty is also of supreme importance to the architect as it permits an infinite variety of pleasing and artistic effects.

Facing Bricks and Enameled Bricks

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO
Montreal Agent: **David McGill, 83 Bleury Street**

Wooden Water Pipe

Galvanized Wire Wound and Continuous Stave Pipe for Water Works, Power, Irrigation, Etc.

Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquirers. Write for prices.

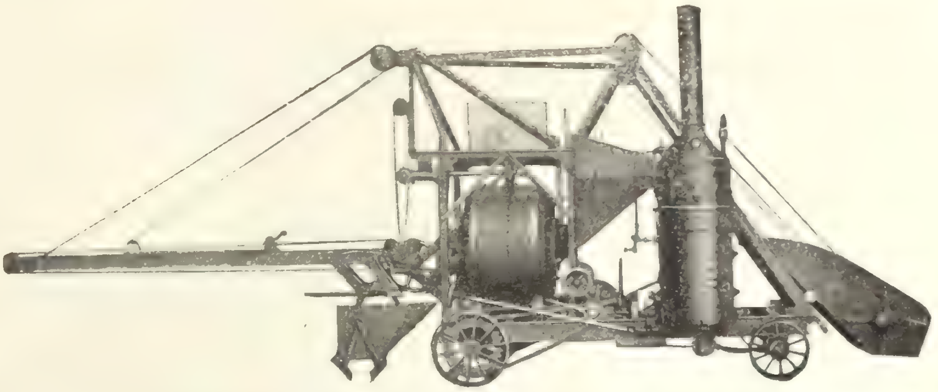
Manufactured by

Canadian Pipe Co., Limited

Factory: 550 Pacific St., VANCOUVER, B. C.

P. O. BOX 915.

London Standard Drum Batch Mixer


London Street Paving Mixer with front board and delivery boom

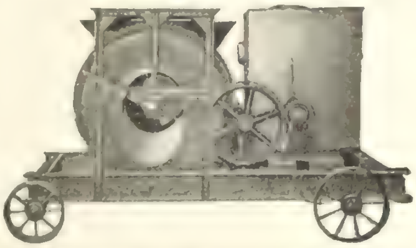
Before you Buy Machinery or Equipment of any kind

write to us for our 1912 CATALOGUE. It will save you TIME and MONEY. Do you know that we are the ONLY LARGE MANUFACTURERS who specialize on

Concrete Machinery and Contractor's Equipment

The following is a few of our lines

- **London Standard Drum Batch Mixer** in Five sizes any kind of Power or Equipment.
- **Drum Paving Mixer** with Forward Loader and Rear Discharge.
- **Drum Paving Mixer** with Side Loader and Rear Discharge.
- **Automatic Batch Mixer** Two sizes any kind of Power.
- **Mortar Mixers.**
- **Hand Power Concrete Mixers.**
- **Tile Moulds.**
- **Cement Block Machines.**
- **Cement Brick Machines.**
- **Cement Tile Machines.**

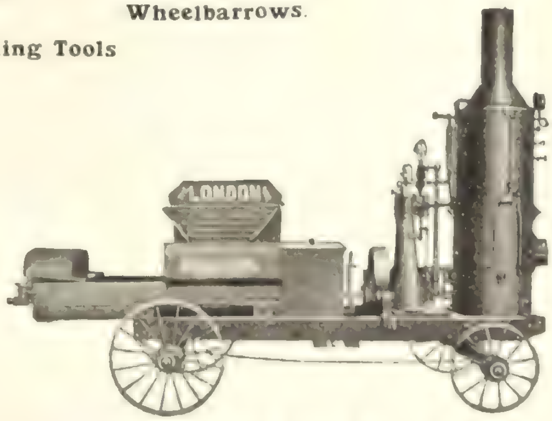

London Standard Drum and Batch Mixer

- **Side Walk Tile Machines.**
- **Sill Step and Window Cap Moulds.**

- **Ornamental Moulds.**
- **Rock Crusher.**
- **Screen** and **Elevators.**
- **Mason's Sand.**
- **Screening Machine**
- **Gasoline Engines.**
- **Pumping Outfit.**
- **Gasoline Hoists**
- **Sidewalk Forms.**
- **Material Elevators.**
- **Driers** both Portable and Stationary.
- **Fence Post Moulds.**
- **Concrete Carts.**
- **Wheelbarrows.**

And a Complete line of Cement Working Tools

London Mortar Mixer



London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

Toronto Office: N.E. Cor. Richmond & Bay Sts.
Winnipeg Office: 445 Main St. Winnipeg, Man.

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B. C. Equipment Co., Vancouver, B. C.

We are the Largest Manufacturers of Concrete Machinery in Canada

WETTLAUFER
HEART-SHAPED
MIXER

The Heartshape Drum

Gives

Quick Charging
Quick Mixing
Quick Dumping

The Heartshape Mixer

ensures

Long Life

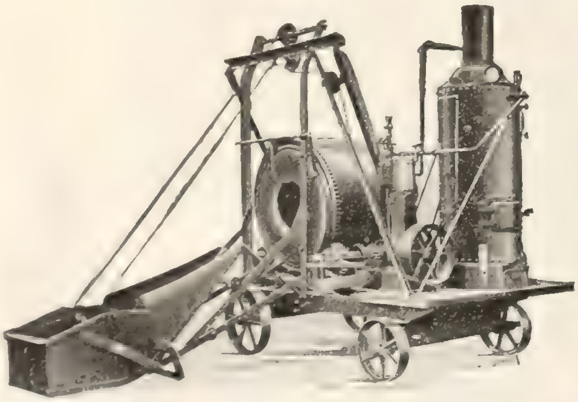
and

Perfect Work
All the Time.

YOU CAN'T GO WRONG

in buying a "Wettlaufer Heartshape Mixer." There is not an atom of doubt that these Mixers will do the best work. Come and see it working and we will prove conclusively to you that

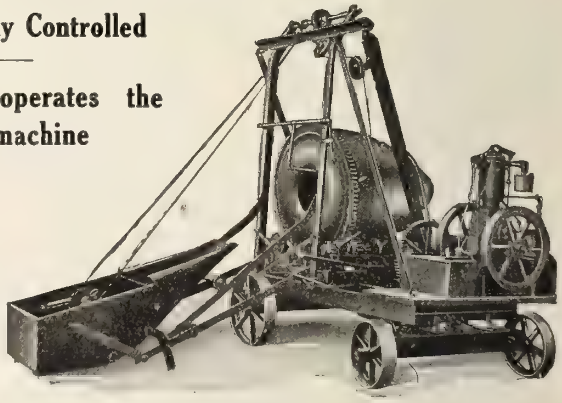
IT IS THE BEST MIXER ON THE MARKET



Automatically Controlled

One man operates the entire machine

Write for
1912
Catalog



The purchase of a reliable mixer of recognized make at the outset of a contract will save you money and time all along the line.

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

Wettlaufer Bros.

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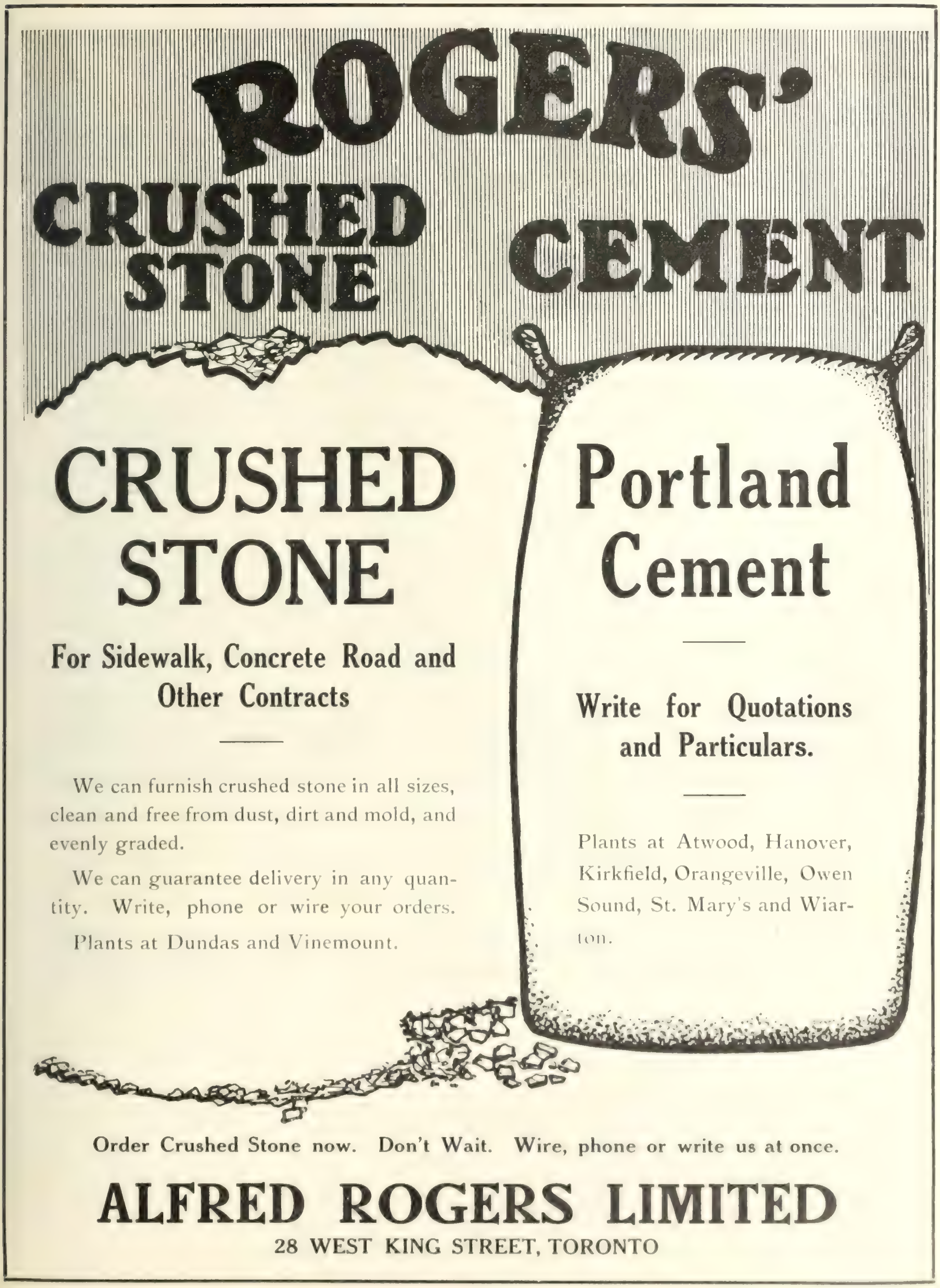
Hooton & Moore
710 Builders' Exchange, Portage Ave.,
Winnipeg, Man.

MONTREAL OFFICE and WAREROOMS: **316 Lagauchetiere St. W.**

Head Office: Toronto, Ont., 178 Spadina Ave.



CRUSHED STONE

For Sidewalk, Concrete Road and Other Contracts

We can furnish crushed stone in all sizes, clean and free from dust, dirt and mold, and evenly graded.

We can guarantee delivery in any quantity. Write, phone or wire your orders.

Plants at Dundas and Vinemount.

Portland Cement

Write for Quotations and Particulars.

Plants at Atwood, Hanover, Kirkfield, Orangeville, Owen Sound, St. Mary's and Wiarton.

Order Crushed Stone now. Don't Wait. Wire, phone or write us at once.

ALFRED ROGERS LIMITED

28 WEST KING STREET, TORONTO

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  Huber Manufacturing Co.
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  Canadian Supply Company
  Galt Art Metal Co.
  Metallic Roofing Co.
  Noble, Clarence W.
  Paterson Mfg. Co.

(Continued on page 14)

Durable Roads

For the **highest efficiency** in waterproof macadam road construction—for the most durable, dustless, waterproof, trafficproof roads at the **lowest cost** per mile per year of service—engineers should specify

"Pioneer" Road Asphalt

Road experts everywhere are enthusiastic over their success with "PIONEER."

If interested in **durable** road construction write us for specifications and data.

Build up your old macadam roads by using **"Pioneer" Road Surface Asphalt.** Makes a smooth, rubbery surface—and one application will lay the dust for an entire year! Write for specifications on **Road Surface Asphalt,** also on **"PIONEER" Filler Asphalt and "PIONEER" Paving Cement.**

The Canadian Mineral Rubber Company, Ltd.
503 Canada Building, WINNIPEG

J-M ASBESTOS ROOFING

Made of SOLID ROCK fibers.
Long-lived. Unburnable.
Never needs coating.
Makes buildings cool in Summer and warm in Winter.
Result of half a century's experience.

Sold direct where we have no dealer. Write nearest branch for sample of the curious Asbestos Rock and Catalogue No. 303.

The Canadian H. W. Johns-Manville Co., Limited

Manufacturers of Asbestos and Magnesia Products

ASBESTOS

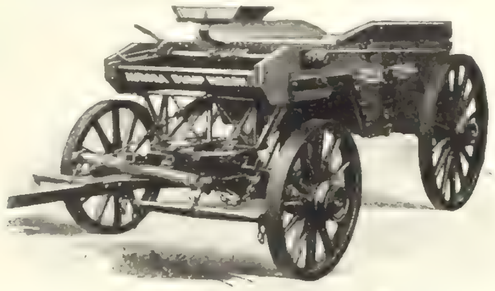
Asbestos Roofings, Packings, Electrical Supplies, etc.

TORONTO, ONT. MONTREAL, QUE. WINNIPEG, MAN. VANCOUVER, B.C.

1452

THE STRENGTH OF OAK WITH 40 PER CENT SAVING IN WEIGHT

That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the



"Aurora" Dump Waggon

Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.

Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

Slotted hinges on doors give vertical movement, preventing installing team on dump.

Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

Western Wheeled Scraper Co.
AURORA, ILL.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or 5⅔c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.

Hagersville, Ont. Limited

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  Dominion Sewer Pipe Co.
  Ford Iron Company.
  Gartshore Thomson Pipe Co.
  International Clay Products Bureau
  National Iron Works
  Ontario Sewer Pipe Co.
  Ontario Lime Association
  Smyth & Ryan
  Standard Drain Pipe Co.

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  Inglis, John
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  Marsh & Henthorn
  McDougall Caledonian Iron Wks
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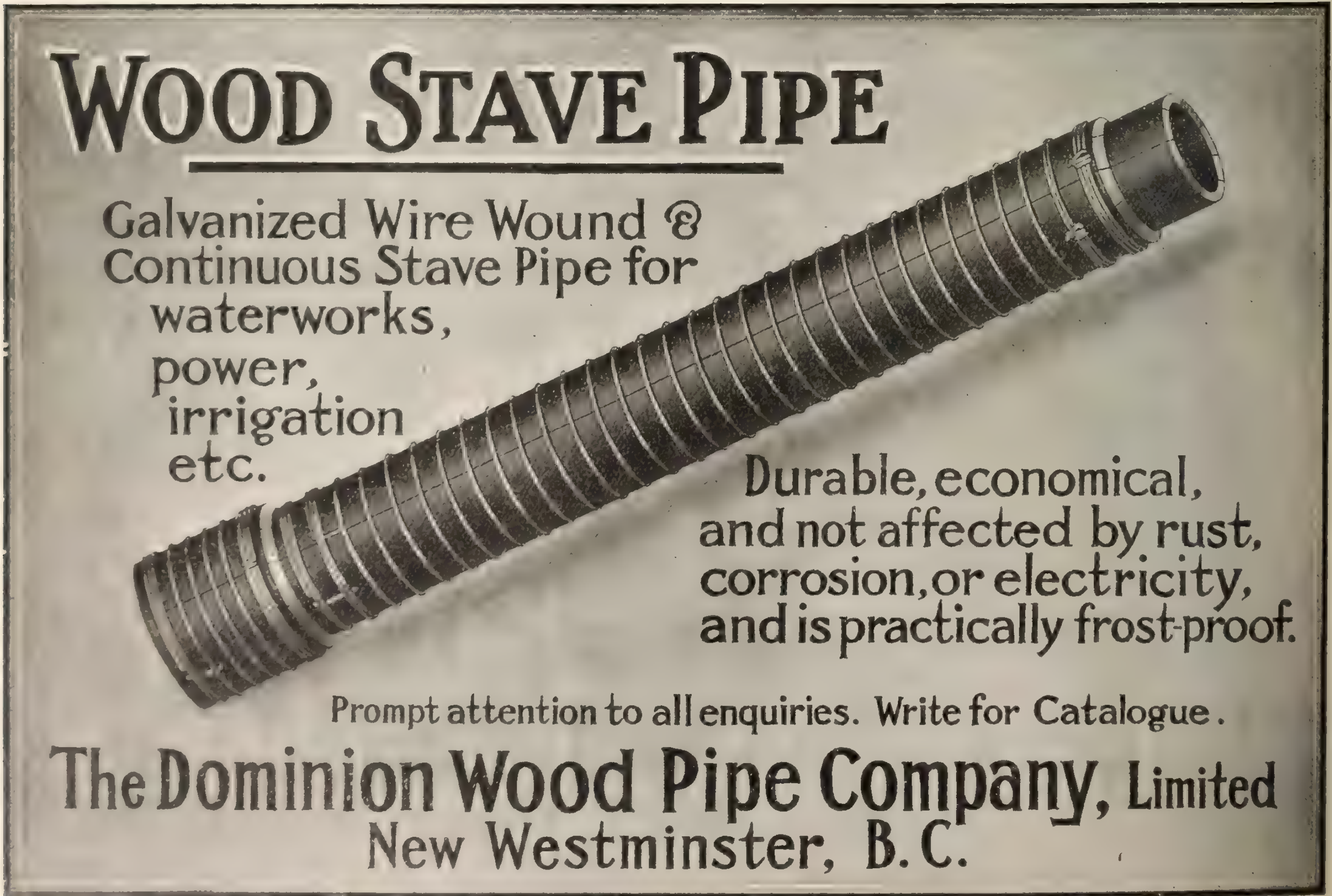

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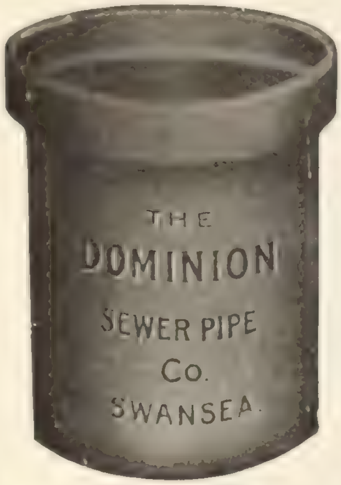

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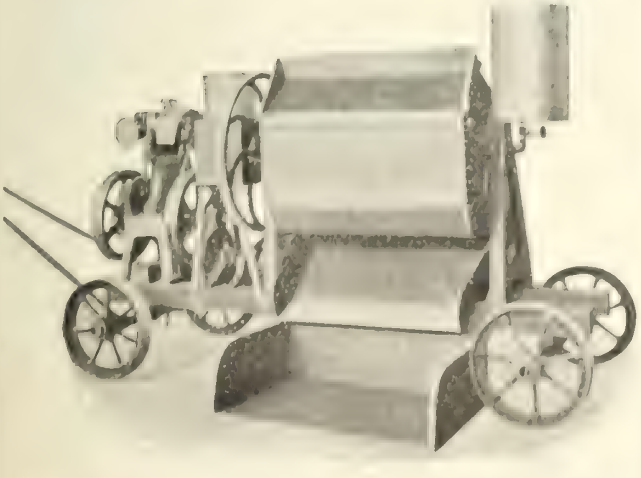

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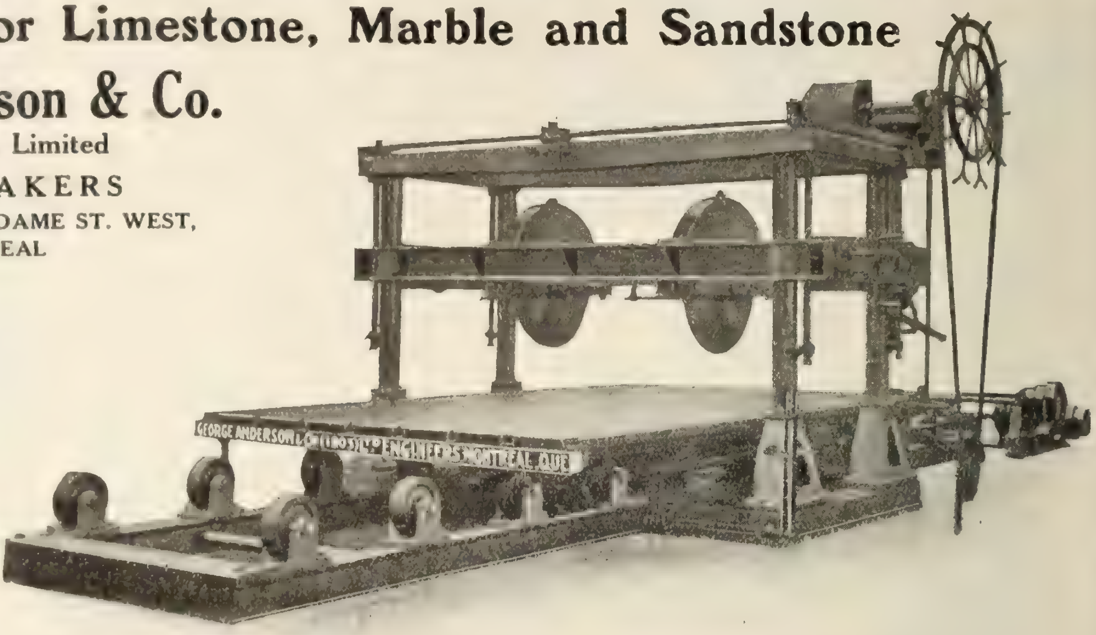

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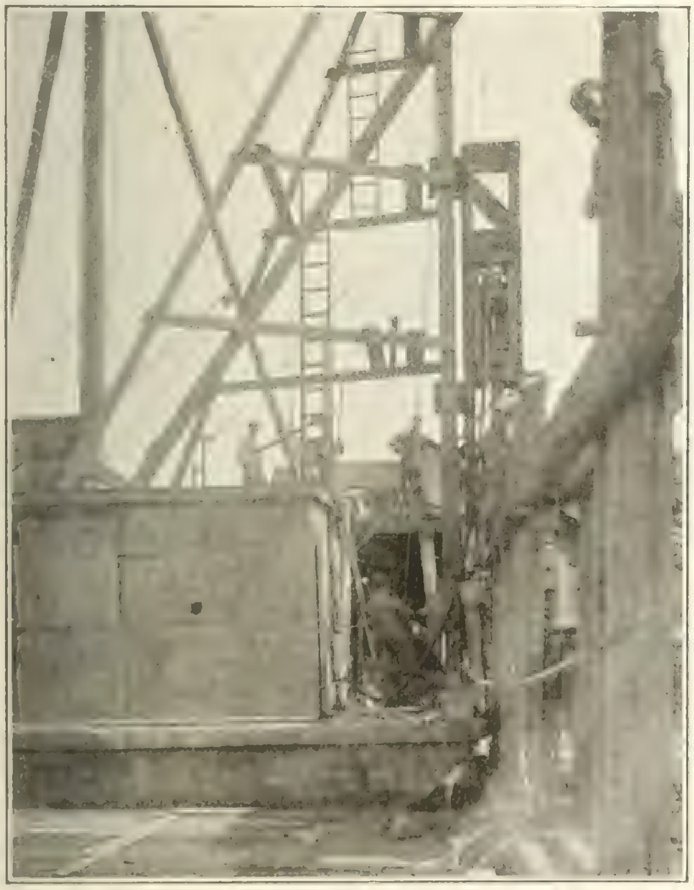

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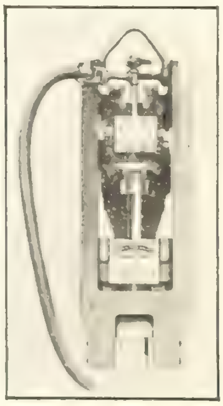

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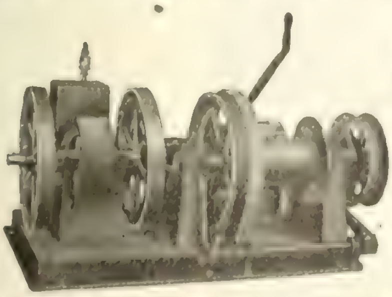

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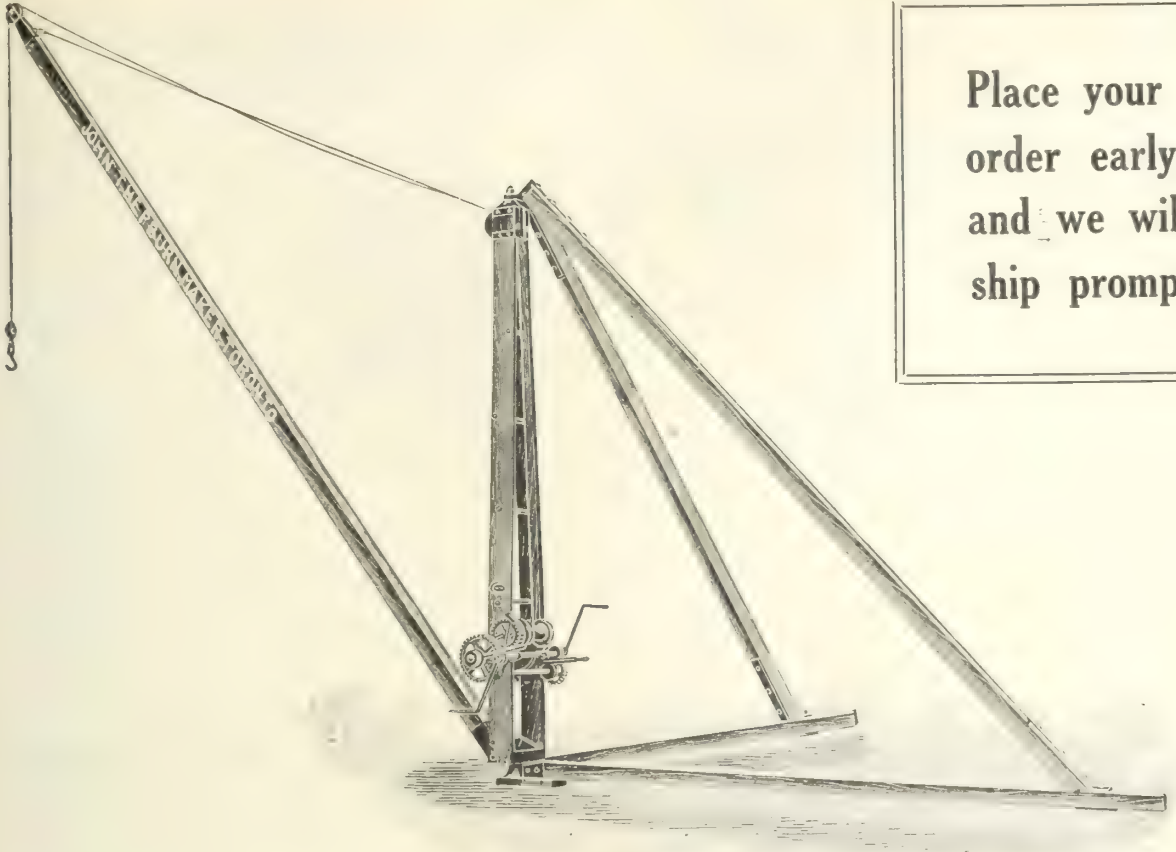
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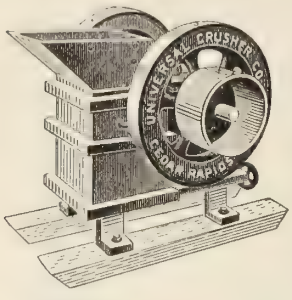

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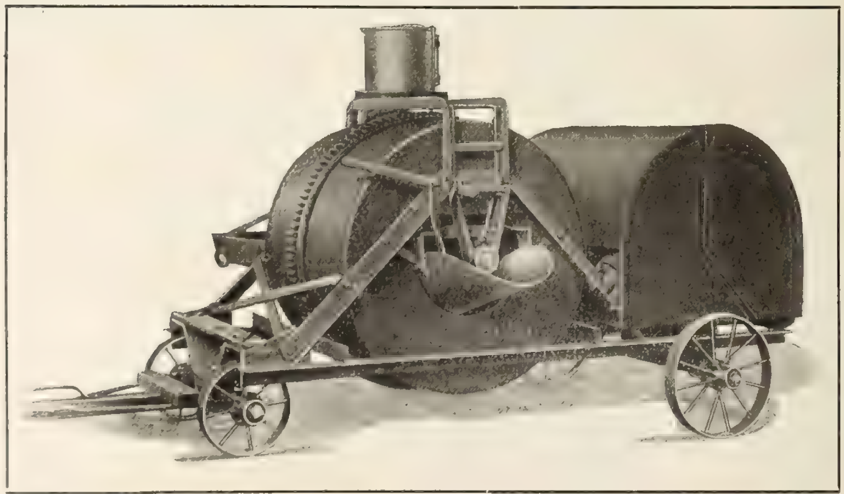

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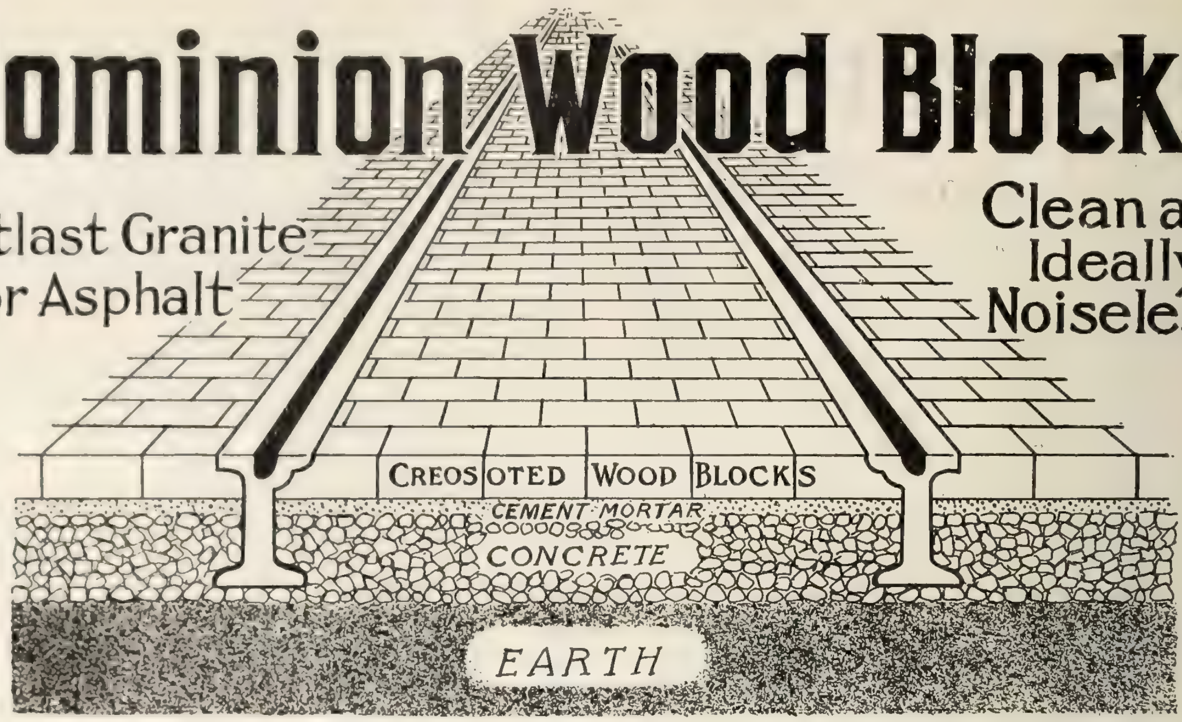

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It is rapidly becoming the standard pavement in all cities of any importance, both in Europe and America.

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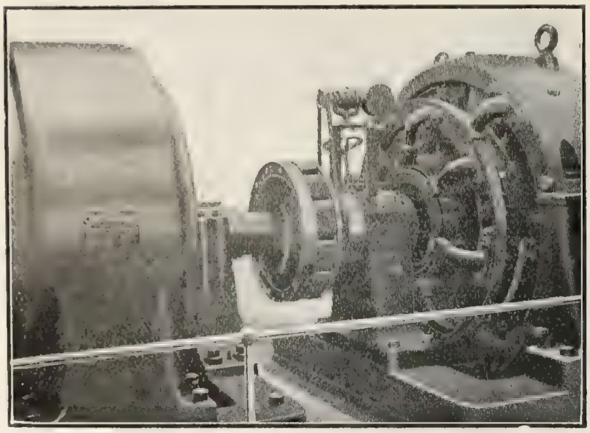

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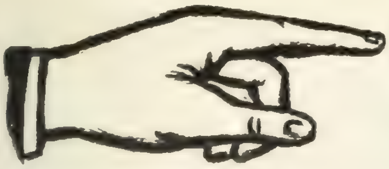

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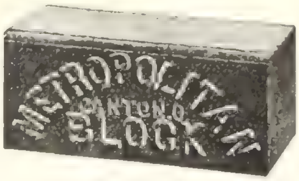

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The Thew Automatic Shovel Company, Lorain, Ohio.

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For Reinforcing Concrete.
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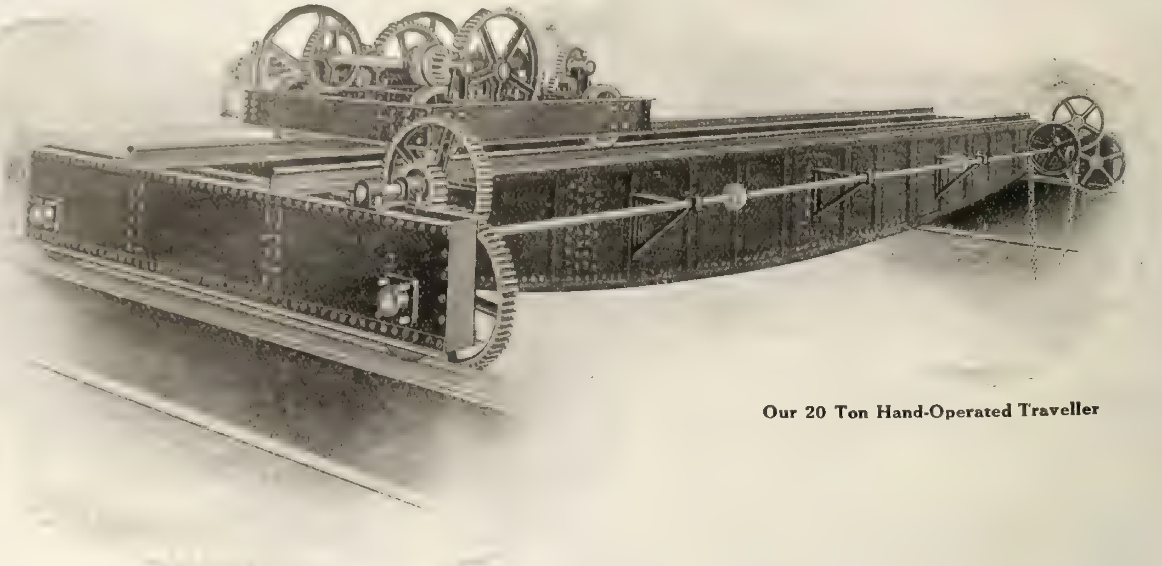

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THERE ARE three continuous, independent opposed mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

And the important feature is that the actions being independent and opposed to one another there is an intermingling of the entire mass of material contained in the drum.

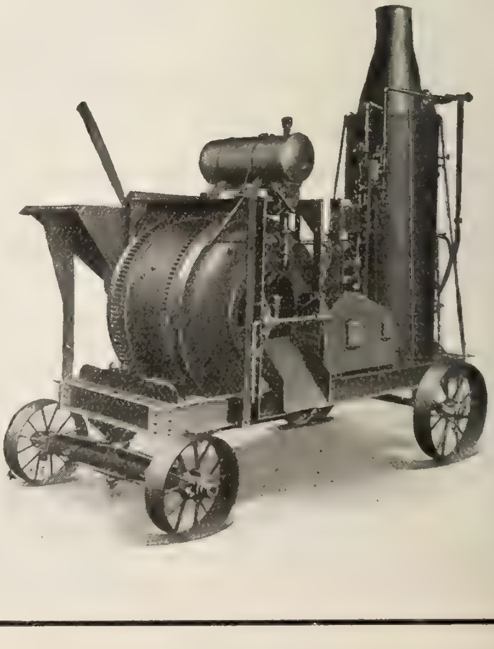
Three opposed mixing actions also make impossible a series of flows, such as produced by mixers depending on the form of the drum or a series of blades or scoops, in which the fine material gravitates to the bottom and the coarse collects on top.

This three-in-one mixing action, producing a perfect intermingling of the entire mass, is a guarantee of the largest quantity of perfectly mixed concrete in shortest time not equalled in the mechanical design of any other mixer.

And since mechanical mixers are only used to produce more of better concrete than can be mixed by hand, this improved Koehring principle of mixing must be the most important feature to every discriminating user of mixers.

And we are just as anxious to tell you about the improved mechanical features of the Koehring Mixer, fully illustrated and described in our new 1912 catalog of nearly 100 pages.

It's a book that not only describes the Koehring Mixer but contains valuable concrete tables that makes it practically indispensable to every user of mixers. A copy will be sent to you by first mail on request.



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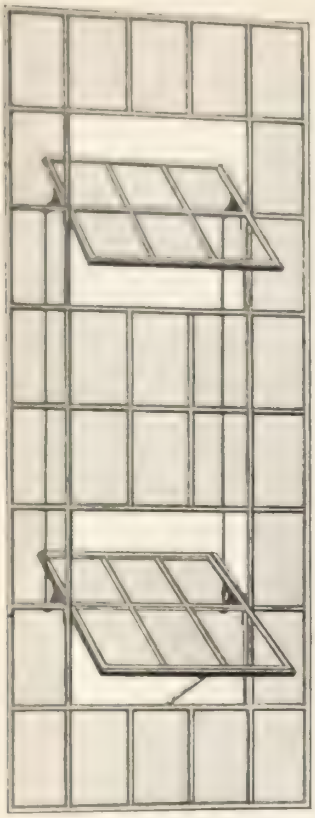

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ON THE ORMSBY-LUPTON "UNDERWRITERS" STEEL SASH all Ventilators have our Patented Two Point Contact in a One Piece Section. Our Two Point Contact means absolutely dust, rain and weatherproof Ventilators. When Ventilators are closed you do not want ventilation accompanied by rain and snow coming into the building through the sides of the ventilators.

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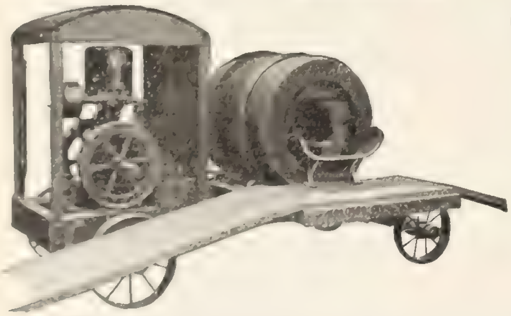

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Low Charging Concrete Mixers

Are Valuable Assets to Any Contractor

Simplicity in construction and operation make in "THE STANDARD" machine so little opportunity for wear that the owner, although he may have used the mixer for several years, can readily dispose of it at almost first cost.

This is easily accomplished because "THE STANDARD" Low Charging Mixer is moderate priced to begin with, the purchaser not being required to buy complicated, unnecessary and expensive charging mechanism and other devices, but the mixer drum only, simply connected and driven by the necessary power.

Many contractors take advantage of this and when doing work in various sections of the country, purchase "THE STANDARD" mixers for each job, and sell the outfit to some local contractor when the work is completed.

The simple method of operating "THE STANDARD" Mixer, the large output of high grade concrete secured, the low first cost and low operating cost, secure ready sale of the outfit to local contractors in any section.

We will guarantee that, when using "THE STANDARD" Low Charging Mixer, you will hear many words of favourable comment from the contractors and other interested parties, on both the simplicity of the machine and the high grade concrete, together with the ease and rapidity with which you can do the work.

Favourable comments are not only words of encouragement to you but encourage others to give you their contract work, and the contractor will doubtless be surprised with additional work secured when using "THE STANDARD" Low Charging Mixer.

The simple fact that the entire batch is in plain view of all, while it is being so thoroughly mixed inside the drum, is not only interesting to everyone, but thoroughly convincing of the high quality of concrete produced.

Catalog No. 245 will give you further information. **Your name brings it.**

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How This Rubber Belting Cuts Production Cost

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Goodyear Rubber Belting stands for ***saved energy—economy.*** Built up of plies of rubberized fabric, cured and vulcanized into the solid piece. Neither slips nor stretches. Has the cohesiveness of rubber with the enduring strength of a specially woven cotton duck fabric from which all stretch has been taken out. It is steam, water, weather and rot proof.

The same high grade materials, the same skillful workmanship and the same years of experience that have built such famous service into the products of the Goodyear Tire & Rubber Co., U. S. A, is doing the same for Goodyear Rubber Belting and our many other rubber products.

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The ideal belt for **Thresher, Small Sawmill** and **Flour Mill** use. Built to meet competition, yet it is far superior to all other third-grade belts because made of tougher rubber, heavier fabric (which means better friction) and better wearing service and cover.

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IMPERIAL HIGH-SPEED FRICTION SURFACE BELT

Specially designed for planer, dynamo, generator or fan work where pulleys are small and high-speeded. If we haven't what you want in stock, we'll *make* it—and *remember* **Goodyear Rubber Belts quickly earn their cost in pains and power saved—yet they cost less than the common kind. Let our expert solve your problem. Send requirements or write for catalog tonight.**

"Our Sales of the last four months 50 greater than those of last year. Defective goods returned only $23.93."

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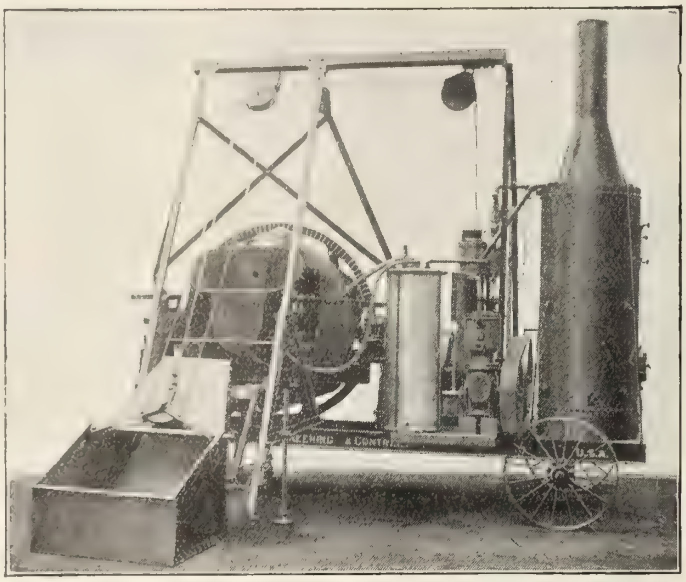
BRANCHES: Montreal Winnipeg St. John, N.B. Vancouver Calgary

A Portable Bituminous Macadam Plant



Austin Cube Mixer with Heating Attachment

which can be kept close up to the men working, is provided by the Austin Improved Cube Mixer with Austin Hot Mixing Attachment. This plant will mix macadam perfectly because of its scientific employment of a hot blast oil spray burner to do the heating. The Austin Hot Blast Heater is a forced spray enclosed in a combustion chamber attached to the under side of the feed hopper and opening into the mixer drum. The blast swings with the mixer drum and is continuous; it does not obstruct or delay charging, discharging or any other mixer movement; it generates its own heat; a turn of the oil cock shuts off or turns on or precisely regulates the heat; it is operated by the regular mixer runner; it is renewable; it does not encumber the mixer in any way or reduce its speed for mixing cold or hot.

No principle of perfect mixing is interfered with by the Austin Hot Mixer Attachment. The cube principle of mixing is by incorporation under pressure—kneading. There are no buckets, paddles, wings or other contrivances on the inside of the cube. It is the shape of the drum that does the mixing. This is what makes it the most rapid, most economical and most accurate mixer on the market.

Full details are given in Catalogue and Special Circular No. 8

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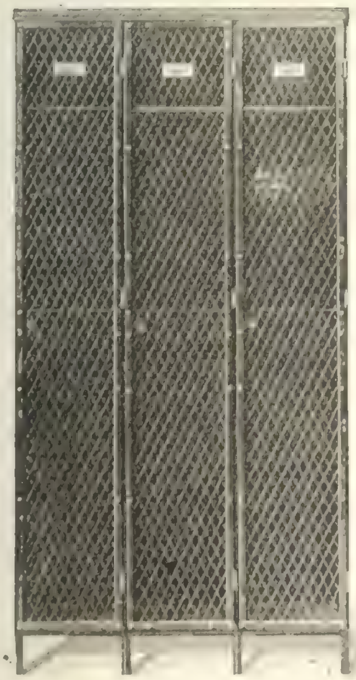

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It you appreciate good value and rigid construction in a locker, you will use MEADOWS' METAL LOCKERS on your next contract.

Send for our interesting booklet entitled

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That Fit Snugly

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We specialize in **fireproof building materials, Esco Steel protector paint, Ceresit waterproofing, heating and ventilating, hydro electric plants,** and represent the **latest** and **best ideas** in **building, steam** and **mechanical construction.**

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ESTABLISHED 1886
Contract Record and Engineering Review

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Vol. 26 May 29, 1912 No. 22

Monopolies in the Contracting Field

WE learn that the Builders' Exchange of the city of Calgary has placed itself on record as being opposed to the award of contracts for local work to outside firms. The Exchange is convinced that it is a mistaken policy for an owner contemplating the erection of, say, an eight or ten storey building to entrust the work to a "big" eastern contractor.

Now we always thought that the people of Calgary, the institutions of Calgary and the city itself had a great future—and we still think so; but we cannot think that the city's highest ambitions will be realized upon the basis of "Calgary for Calgarians." It is different with the smaller "jumping off" places throughout the west. But we thought that Calgary had outgrown that stage. The policy of giving the contract for one's house to the man who patronizes one in some small line, such as groceries or clothing, is near-sighted and in fact belongs to one of the generations of the last century. The man to whom a contract should be awarded, every time, is he who can show the best figure, always provided of course that his financial resources and previous record will bear investigation. We would not care to see Calgary's policy of thus discriminating against the east generally adopted throughout western Canada. The prosperity of this country depends upon our breaking down any barriers between east and west. Kipling's lines, "For east is east and west is west, and never the twain shall meet," have an altogether wider application than Canada. If the builders of Calgary are unable to stand up against competition it is time that the city itself encouraged outside firms. If Calgary contractors are capable of sustaining their end, if their resources and equipment are right and their prices good, they will surely have a sufficient advantage over eastern firms by virtue of being encamped right upon the scene of operations. What then have they to fear? Why discriminate against outsiders? It is a poor argument that because a man has spent so many years in a city and obtained in it what little experience he possesses that he should have the first call upon important local work. He may obtain the job and put it through, after a fashion, but in many cases without half the expedition and general satisfaction that an outside firm with greater experience and better equipment will do it. And there is another viewpoint. The outsider obtains a big contract and, being impressed with the growth and prospects of the city, puts into it his very best work with the idea of obtaining more important contracts later on. In cases he will establish a permanent branch office in the city. There is not this expansion with the local contractor who is carrying out a contract of magnitude for the first time. Often he plods along through the job placing far too much reliance upon his knowledge of local conditions and upon the influence which his name carries among those having the supervision of the work.

In whatsoever sphere of life there is nothing like competition. The world's time records in the field of sport, for instance, have not been made by jogging around the track alone at the pace of a "constitutional": they have been won after a neck-and-neck contest with the breath of an opponent hard upon the ear. There are no such gruelling tests as this in the contracting business, but the principle holds good. The men who run alone by virtue of local monopolies are a menace to the progress of their city.

The representative Canadian contractor is not afraid of standing alone. He wants no local clique. He is prepared to submit a figure and to stand by it, and if the other fellow beats him, whether he come from the next street or from any old place—from Beersheba to Dan, he is welcome to the job.

To tell the truth we are rather surprised at Calgary.

Prohibition of Apartment Houses in Toronto

In a letter to the Toronto Globe, a correspondent of that paper discusses with rather more than the usual acumen evidenced in such letters the city council's by-law regarding apartment houses. After disclaiming responsibility for any share in the election of the present members of the Toronto city council, this writer attemps to show upon what meagre grounds of complaint the present by-law has been framed. Relative to the advantages of apartment house life, he says:

> I have lived in apartment houses in Toronto for [illegible] and also in detached houses, and of the two the [illegible] of the former is [illegible] more desirable than [illegible] sanitation, convenience, good service and a solution of several of the problems of life that it would behoove the Council to place their restrictions rather on the single than on the apartment house. I am not referring in this to tenement houses, but to the better class of apartment house. In the latter there are always employees to keep the surroundings clean and sightly; if this is not carefully observed the house loses its renting value. In single houses we all know that conditions are allowed to exist among the best of them that would not be tolerated for a moment by apartment house dwellers who are in a position to complain. Plumbing must always be promptly attended to in case of damage, the yards must be clean and the architecture [illegible]

be collected without delay; awnings, screens, walks, porches are a part of the duty of the owner of the apartment house and must be kept in the best of condition. To estimate the desirability of the apartment house from the external point of view, all one has to do is to look at any of the better class in the desirable districts and than compare them with the single houses around.

I think I am in a position to say that an apartment house is of equal quality to, or better quality than, the single house of its neighborhood. This is simple of proof by the rents paid, the outward appearance, the interior convenience and the class of tenants. The tenants of an apartment house are never those who would not be justified in selecting that neighborhood as a residence. Send our health inspector, an educated woman with discernment, a real estate agent with an idea of values—any number of people whose judgment would be of value—through an apartment house of the better class, and the verdict would be that the average of the single houses in the locality is very much less desirable.

"Why, then, legislate against them? Is Toronto to be regulated to maintain the land values of the favored few or to cater solely to their whims against the majority? The very fact that the Aldermen placed apartment houses and garages in the same class as undesirable for residential districts reveals the depth of thought behind this unjust, unwise piece of legislation."

Chicago's Woman Engineer

CHICAGO has the distinction of furnishing the first woman recruit to the ranks of the civil engineers. This is Mrs. Mary E. Ewing, widow of the late William Bion Ewing, a most prominent engineer of the Middle West, who died last spring. Mrs. Ewing has taken up and is carrying to successful completion work on various sewerage and water systems costing approximately half a million dollars, which her husband had under way or in course of planning at the time of his death. She appeared before the boards of all the villages and the different companies with whom Mr. Ewing had contracts, and it is a remarkable tribute to her technical knowledge and executive ability that each village and each company unhesitatingly passed the contracts into her hands for completion of the work.

Mrs. Ewing's training, we are informed, was secured by assisting her husband with his work, in which she was intensely interested, throughout their married life, a period of twenty-five years. Much of Mr. Ewing's planning for the larger contracts was done in the quiet of their home, and so Mrs. Ewing had an opportunity to observe to the best advantage his methods of work and his solutions of the various problems connected with it. They also read and studied together many of the technical books, while Mrs. Ewing took care of the maps, blue prints, tracings and other drawings, besides otherwise "serving as a good office boy," as she expresses it. In addition to this, she went with her husband on many trips of inspection to the scenes of the actual construction, and thus was enabled to become familiar with the practical side of the work.

Although Mrs. Ewing's entrance into a field of work heretofore unexplored by woman has created widespread interest and discussion, she herself is the least excited of anyone. She considers that civil engineering offers splendid opportunities to women who have inclinations in that direction. In her opinion there is no feature of the work that is outside of a woman's element, and put into actual practice she finds it "extremely fascinating."

Letters to the Editor

An Arbitrary Restriction

Toronto, May 22, 1912.

Editor Contract Record:

It is to be regretted that the City Council should take advantage of the power given them by a clause of the Municipal Act, to proceed without apparent consideration to arbitrarily restrict the erection of apartment houses in what have been set apart as residential districts, by a department of the same council.

The matter is equivalent to the present water situation, the difficulties besetting which became so great that a board of experts was found necessary to determine the future course of the city in that matter.

To keep pace with the wonderful growth of this city the constant attention of a capably managed department is essential. An afternoon's discussion by a city council cannot possibly determine what is required in regard to a restriction such as that proposed.

I feel, though I may be wrong, that the whole question of the erection of buildings in this city should be passed upon by a Commission or Board of experts, either to make a report and go out of existence, or continue to exist and report from time to time, which board, or commission, supplementing the unquestioned ability of the City Architect's department, should advise the council in all matters relative to the erection of important buildings, not only with regard to location, but also with regard to structure, design and character.

Canadian architects have always shown themselves willing to give any advice in their power along these lines, even at a considerable sacrifice to their personal interest. Those cities which have taken advantage of this fact have never suffered thereby.

Yours very truly,
F. S. BAKER,
President Royal Architectural Institute of Canada.

Vitrified Clay vs. Concrete

Montreal, May 17, 1912.

Editor Contract Record:

Further to the controversy between the clay tile and concrete pipe interests of Kansas City, we are enclosing another clipping which is self explanatory.*

Yours very truly,
Canada Cement Company, Limited.
L. S. Bruner,
Manager of Publicity.

"The publicity end of the clay products people is out with a rather astonishing and interesting document, relating to the controversy between concrete and clay in Kansas City, Mo., a territory, by the way, in which the entire organization of the clay interests has been hard at work. Here the clay products are heartily supported by the daily press, while concrete is looked upon with indifference and suspicion.

---

* Reference should be made to an article, "Comparative merits of Vitrified Salt Glazed Sewer Pipe and Concrete Sewer Pipe," Contract Record, p. 44, April 3, 1912.

"The document referred to embodies a report of the Public Improvements committee to the upper house of the common council of Kansas City. The report sets forth, in plain language, that an ordinance providing for the use of concrete in Kansas City is invalid, for the reason that the selection of material to be used in public works does not properly come within the province of the council. City Counsellor John G. Park, in a formal opinion, held that the ordinance was invalid for the reason stated.

"A hearing by the Public Improvements committee, consisting of three members of the council, was held in November of last year, at which an inquiry was made into the relative merits of clay and concrete in sewer construction. Former city officials recommended vitrified clay products and those who testified in favor of concrete were men like Prof. Erasmus Howard, of Kansas University; John Donnelly, a former city engineer of Kansas City; A. J. Hammond, formerly city engineer of South Bend, Ind., and J. P. Shearer, of the Board of Public Works, Milwaukee, Wis. All of these testified that cement or concrete pipe, of proper material, properly made, under proper inspection, and properly cured and inspected, could be properly used in the sanitary sewers of Kansas City.

"After a week's hearing, the committee of three men made a committee recommendation that the matter of selecting materials should be left entirely to the Board of Public Works, and that the ordinance should not pass. The three endorsed clay pipe of the vitrified type, but obviously their recommendation could have nothing official in its character, for the reason that the city's legal adviser had told them that the council could not specify materials, that being a matter for the Board of Public Works.

"The ordinance, in accordance with the opinion of the City Counselor, was lost. That is, the council declined to pass a measure that it had no legal right to pass.

"That is all there is to it. But the clay people reprint the committee's report and the text of the ordinance, with the introduction: 'This report means that after the most complete and thorough investigation of the relative merits of sewer pipe material that has ever been conducted by any city in America, Kansas City has decided not to pass the ordinance favoring the use of concrete pipe for sewers, but to allow the Board of Public Works to use vitrified salt-glazed clay pipe as heretofore.' The report means nothing of the kind, either as stated or implied. The reasons why the ordinance was not passed by the council are detailed above, and they are the only reasons. The interpretation put upon the committee's action by the clay publicity men is entirely false and misleading. It will deceive no one who reads the subject matter with care.

"It now remains to be seen whether or not the Board of Public Works of Kansas City will continue to use concrete where it is found to be best. We think that it will."—Concrete.

An undermined dam of reinforced concrete, on the Yahara River, 12 miles northwest of Janesville, Wis., was not injured by its lack of much support for a length of about 50 ft., and its owner, the Janesville Electric Company, does not anticipate any difficulty in restoring the structure to service. The structure has a gate and spillway section 36 feet long and a dam proper 100 feet long. The head is only about 9 feet. The washout occurred where the dam joins the gate spillway and was caused by a leak starting under the foundation of the dam where there had formerly been a washout. The company states that the water was not at an abnormally high stage when the erosion of material from beneath the foundation commenced.

volving cantilever type, and is supported upon a 100 ft. steel tower. Tests showed a deflection of 7¼ in. at the front end of the cantilever when lifting a load weighing 200 tons at a radius of 105 feet.

Experts' Valuable Report upon Toronto Water Supply

THE Report of the Board of Commissioners (comprised of Messrs. J. G. Sing, Willis Chipman, Isham Randolph and T. Aird Murray) upon the existing water works system at Toronto and upon an additional water supply for that city was presented last week. The recommendations involve an estimated expenditure of $8,080,000, made up as follows: improvements to existing system, $1,130,000; duplication of intake pipe, etc., $490,000; installation of meters, $1,140,000; Scarboro' project, $5,320,000.

The Report is accompanied by a complete set of plans and charts and is divided into various sections containing respectively the recommendations and conclusions of the Commission; interim reports; a detailed consideration of existing conditions; historical and descriptive notes, and reports upon the sources of supply other than Lake Ontario and upon the pollution of Lake Ontario.

The Commission have not only furnished the City of Toronto with one of the most comprehensive reports of the kind ever presented to a Canadian municipality but they have compiled a work which will rank as a valuable contribution to engineering literature.

The summary of the Commission's recommendations is given below:

Source of Supply

(a) That the present and future source of water supply for the City of Toronto must depend solely upon Lake Ontario.

Character of Lake Water

(b) That bacteriological, chemical and visual examinations of Lake Ontario water from Mimico to Scarboro' Heights have demonstrated that there is no locality within ten miles from the north shore of the Lake from which water can be drawn which will at all times present a safe supply, unless such water be subject to some form of purification. Although it is also apparent, from the evidence gathered, that water in the immediate vicinity of the city is subject to a greater degree of impurity for longer periods than water at a distance. It is also concluded, from the evidence, that the transporting Lake currents are from the east to the west, and that there is a lesser probability of impure water to be met with off Scarboro' than off Mimico.

Present Source of Supply

(c) That, taking into consideration the existing system, including filtration works, intake, conduits, tunnel under the Bay, pumping machinery, large mains, and reservoir, it would be uneconomical and unnecessary to abandon it.

That the entire system should, however, be maintained in a proper condition of efficiency and early [illegible] brought up to a safe maximum capacity of at least sixty million gallons per day.

Improvements in Existing System

(d) That, by laying the duplicate Intake Pipe now under contract, the duplication of the filtration plant, the connecting up of the sixty-inch steel conduit across the Island and the installation of additional pumping machinery at John Street Station the existing system may be relied upon to supply sixty million gallons per day and for a [illegible] which will meet a demand of ninety million gallons.

And that these proposed improvements be immediately undertaken, otherwise the City will undoubtedly be confronted with a water famine in the immediate future.

It is considered that until the second Intake be completed, that Long Pond be retained in such condition that it may be converted into a settling basin for the City water supply upon twenty-four hours' notice.

Future Water Supply

(e) That all the available evidence points to the necessity of increasing the water supply to meet the demands of one million population, and that it is not advisable to rely upon the present location for such increased supply. Taking into consideration the probable future rapid growth of the city, it is reasonable that the present location of supply be considered only as a central unit, and that extra units be installed either east or west of the central unit. That, owing to the demonstrated fact that purer water is obtainable for longer intervals of time east of the Harbor than to the west, and owing to the high elevations of the plateau at Scarboro', a second unit be first installed at this location.

That all preliminary surveys, plans, etc., for the Scarboro' system be proceeded with immediately and works placed under contract.

It is concluded that, until Toronto can be assured of a second independent and reliable supply of water from the Lake, what have been considered as exceptional and unpreventable circumstances may again arise to the discomfort of the citizens and consequent lack of confidence in the organization of the Water Works Department of the City.

The possibility that a third unit of supply may in the future be required to the west of the harbor, is admitted but not as yet anticipated in this Report.

Sewage Pollution

(f) That, owing to the fact that the City is about to discharge sewage into Lake Ontario at a point about two and one-half miles east of the Harbor, it is of the utmost importance that the sewage be so treated that infectious matter be destroyed before being so discharged. That it is not apparent that the city is at present, by the proposed method, about to dispose of the sewage in a manner and to a degree which will insure a safe water supply from Lake Ontario in the vicinity of Toronto.

Installation of Meters

It is estimated by the Commission that the general adoption of meters in the city of Toronto would effect a saving of $200,000 a year.

Compression Tests of Brick used in the Neilson Factory, Toronto

PARTICULARS of compression tests of brick used in the construction of the Neilson factory at Toronto, the collapse of which resulted in the death of two persons and the injury of many others, are given below. These tests were made for the City Architect, Mr. McCallum, in the laboratories of the University of Toronto and were submitted as evidence at the coroner's enquiry. In general the tests indicate that the mortar and the various brick were capable of withstanding far greater loads than are prescribed by the civic regulations.

The first set comprises the four sand lime bricks and the four burnt bricks, numbered 1, 2, 3 and 4. The frogs of each of these burnt bricks were filled with plaster of paris and allowed to set before being tested and the total area considered under compression was taken as the outside dimensions of the bricks. The last series of bricks were selected from piles indicated by the inspector and contractor as being the bricks used in the construction of the factory. One whole brick was taken from among the brick in the wall which has fallen. The report on this brick is kept separate and marked as such. In this last series great care was taken in preparing the bearing surfaces of the bricks, to make certain of having a plane surface.

Samples of mortar were also selected from the fourth storey of the building, at the section which had broken away, on which three compression tests were made. A test was first made of an approximate square inch of the mortar. This sustained a load of 184 lbs. Two other pieces were taken from the wall and tested. The areas of these pieces were 2.5 sq. ins. and 4.25 sq. inches and they held respectively 183 and 191 lbs. per square inch. The contractor states that the bricks were laid on this particular spot of the building on April 12th, so that this mortar had been setting approximately three weeks and six days before the above tests were made.

COMPRESSION TEST OF SAND LIME BRICK

No. 1.—Dimensions, 8.75 in. long x 4.15 in wide x 2.45 in. high; area under compression, 36.3 sq. ins.; ultimate load, 71,900 lbs.; ultimate stress, 1,980 pds. per sq. in. Remarks: 1st crack occurred at 44,500 and showed at centre of brick first, from that load to the ultimate load it crumbled down.

No. 2.—Dimensions, 8.75 in. long x 4.1 in. wide x 2.4 in. high; area under compression, 35.9 sq. ins.; ultimate load, 74,500 lbs.; ultimate stress, 2,070 lbs. per sq. in. Remarks: 1st crack at 51,000 lbs. Commenced to fail at end of brick.

No. 3.—Dimensions, 8.75 ft. long x 4.1 in. wide x 2.4 in. high; area under compression, 35.9 sq. ins.; ultimate load, 64,300 lbs.; ultimate stress, 1,710 pds. per sq. in. Remarks: 1st crack at 44,000 lbs. Commenced to fail at end of brick.

No. 4.—Dimensions, 8.80 in. long x 4.1 in. x 2.4 in. high; Area, 36.1 sq. ins.; ultimate load, 73,400 pds. per sq. in.; ultimate stress, 2,030 lbs. per sq. in. Remarks: 1st crack at 49,000 lbs. Commenced to fail in centre of specimen.

Test of burnt bricks with frog in the centre of one side only. Frogs filled with plaster paris. Area under pressure taken as outside dimensions.

No. 1.—Extra hard, almost clinker bricks, semi-vitrified. used as a facing brick. Dimensions, 8.75 in. long x 3.85 in. wide x 2.5 in. high; area, 33.7 sq. in.; ultimate load, 143,600 lbs.; ultimate stress, 4,260 pds. per sq. in. Remarks: 1st crack 72,000 lbs. Commenced to fail at the side.

No. 2.—Average hard red brick. Dimensions, 8.8 in. long x 4.05 in. wide x 2.45 in. high; area, 35.6 sq. in.; ultimate load, 51,300 lbs.; ultimate stress, 1,440 pds. per sq. in. Remarks: 1st crack 42,000 lbs. Failed at end first.

No. 3.—About the same as No. 2. Dimensions, 8.8 in. long x 4.0 in. wide x 2.5 in. high; area, 36.6 sq. ins.; ultimate load, 52,900 lbs.; ultimate stress, 1,485 pds. per sq. in. Remarks: 1st crack 34,000. Failed at side first.

No. 4.—Soft "Salmon Brick." Dimensions, 8.75 in. long x 4.05 in. wide x 2.5 in. high; area, 35.4 sq. ins.; ultimate load, 34,000 lbs.; ultimate stress, 960 pds. per sq. in. Remarks: 1st crack 25,000 lbs. Failed at side first.

TEST OF FACING BRICK

These bricks were carefully ground to give a perfectly plane surface. The frog was not filled at all and the area under compression is taken as the outside dimensions minus the area of the frog. Bricks were all 2.5 in. high.

No. 1.—Outside dimensions, 8.75 in. long x 4.0 in. wide equals 35.0 sq. in.; area of frog equals 5.8 in. long x 2.25 in. wide equals 13.05 sq. in.; net area under compression, 21.95 sq. in.; ultimate load, 85,900 lbs.; ultimate stress, 3,910 lbs.

per sq. in. Remarks: 1st crack at 53,000 lbs. Failed at corner first.

No. 2.—Outside dimensions, 8.85 in. long x 4 in. wide equals 35.4 sq. in.; area of frog, 5.8 in. long x 2.25 in. wide equals 13.05 sq. in.; net area of compression, 22.35 sq. ins.; ultimate load, 77,000 lbs.; ultimate stress, 3,450 pds. per sq. in. Remarks: 1st crack at about 49,000 lbs. Failed suddenly.

No. 3.—Outside dimensions, 8.8 in. long x 4.0 in. wide equals 35.2 sq. ins.; area of frog, 5.85 in. long x 2.15 in. equals 12.58 sq. ins.; net area under compression, 22.62 sq. ins.; ultimate load, 70,300 lbs.; ultimate stress, 3,100 pds. per sq. in. Remarks: 1st crack at about 44,000 lbs. Chipped on the sides during test.

No. 4.—Brick taken from fallen wall. Outside dimensions, 8.6 in. long x 3.9 in. wide equals 33.5 sq. in.; area of frog, 5.8 in. long x 2.2 in. wide equals 12.75 sq. in.; net area under compression, 20.75 sq. in.; ultimate load, 94,000 lbs.; ultimate stress, 4,530 pds. per sq. in. Remarks: 1st crack appeared at about 73,000 lbs. This brick was an exceptionally hard one.

TEST OF "SALMON" AND BUFF FILLERS

Specimens carefully ground to a plane surface. Area under compression taken as a difference between outside dimension and area of frog.

No. 1.—"Salmon brick." Outside dimensions, 8.75 in. long x 4.0 in. wide equals 35.0 sq. ins.; area of frog, 5.85 in. long x 2.5 in. wide equals 13.45 sq. ins.; net area under compression, 21.55 sq. ins.; ultimate load, 32,000 lbs.; ultimate stress, 1,485 pds. per sq. in. Remarks: 1st crack at 26,000. Failed at end first.

No. 2.—"Salmon Brick." Outside dimensions, 8.75 in. long x 4.0 in. wide equals 35.0 sq. ins.; area of frog, 5.8 in. long x 2.25 in. wide equals 13.05 sq. ins.; net area under compression, 21.95 sq. ins.; ultimate load, 43,400 lbs.; ultimate stress, 1,975 pds. per sq. in. Remarks: 1st crack at 31,000. Failed on side first.

No. 3.—"Salmon Brick." Outside dimensions, 8.85 in. long x 4.0 in. wide equals 35.4 sq. ins.; area of frog, 5.9 in. long x 2.2 in. wide equals 13.0 sq. in.; net area under compression, 22.4 sq. ins.; ultimate load, 35,600 lbs.; ultimate stress, 1,590 pds. per sq. in. Remarks, 1st crack at 25,400. Failed on side first.

No. 4.—"Buff Brick." Outside dimensions, 8.75 in. long x 4.0 in. wide equals 35.0 sq. in.; area of frog, 6 in. long x 2.25 in. wide equals 13.5 sq. in.; net area under compression, 21.5 sq. in.; ultimate load, 35,800 lbs.; ultimate stress, 1,665 pds. per sq. in. Remarks: 1st crack at 23,000 lbs. Failed at corner first.

No. 5.—"Buff Brick." Outside dimensions, 8.75 in. long x 3.95 in. wide equals 34.6 sq. ins.; area of frog, 5.8 in. long x 2.25 in. wide equals 13.05 sq. ins.; net area under compression, 21.55 sq. ins.; ultimate load, 66,100 lbs.; ultimate stress, 3,060 pds. per sq. in. Remarks: 1st crack at 36,000. Failed at corner. From appearances this seemed to be a much better burnt brick than No. 4 or the other "Salmon Bricks."

ABSORPTION TEST OF BRICK USED IN THE NEILSON BUILDING

Description of Brick	No.	Weight dry	Weight wet	Absorption	Average Absorption
Sand & Lime	I	5 lb 9½ oz	6 lb 4½ oz	12.29%	12.04
Inside Face	II	5 " 9 "	6 " 3½ "	11.79%	
Grey	III	4 " 1 "	[illegible]	19.8[illegible]	[illegible]
Insiders	IV	3 " 11½ "	4 " 11½ "	25.6[illegible]	
Salmon	V	4 " 11 "	5 " 12 "	17.95%	18.15
Insiders	VI	4 " 15 "	5 " 13½ "	18.35%	
Hard Red	VII	5 " 2 "	5 " 15½ "	16.46%	14.33
Outside Face	VIII	5 " 10 "	6 " 5 "	12.2[illegible]	

Cantilever beams of reinforced concrete support the two balconies of a theatre recently built in Frankfort on the Main, Germany. The beams under the first balcony have an overhang of about 16 ft., while the overhang of those above is 8 ft.

Neilson Building—Report on Existing Structure

The following is the report submitted by an expert commission comprised of Messrs. C. R. Young, J. Francis Brown, Chas. D. Lennox, Robt. Newall and R. Chalkey, appointed by the various interests concerned to examine and report upon the existing structure at the site of the Neilson building collapse.

"We, the undersigned, have thoroughly examined the Neilson building from basement to parapet, and have found no evidence whatever of structural weakness. We would strongly recommend the immediate proper reconstruction of the south wall and the completion of the remainder of the building.

"Acting upon our instructions, the Neilson company have applied loads to the third, fourth and fifth floors, also the roof, adjoining the north wall, from 25 per cent. to 40 per cent. in excess of the loads permitted by the City Architect for this building, and upon careful and thorough examination no change or evidence of weakness was found anywhere.

"We believe this to be an absolutely fair test and to show conclusively that the building is properly constructed and capable of being occupied for the business for which it was built. We do not hesitate in making this statement, as our examination has been most thorough, and we consider the building absolutely safe and in fit condition to be occupied continuously from this time forth. (Signed) J. Francis Brown, Chas. D. Lennox, C. R. Young, R. Chalkey and Robert Newall."

The "Made in Canada" Exhibition Train

The "Made-in-Canada" special exhibition train of the Canadian Pacific Railway, which was recently sped upon its 48-day tour of the country by H.R.H. The Duke of Connaught, is probably unique in its purpose throughout the globe. The displays are arranged in ten standard baggage cars fitted with side aisles and various sized compartments according to the needs of the individual exhibitors. The itinerary of the train covers a distance of 6,500 miles, all of which is to be travelled over the lines of the C. P. R. From first to last the products shown are of Canadian labor and, as far as possible, of Canadian material. Among the exhibits may be mentioned the following: steel rails, by the Algoma Steel Company, Limited, Sault Ste. Marie, Ont.; asbestos shingles, slates, sheathings, etc., by the Asbestos Manufacturing Company, Lim- Boxer Company, Limited, Toronto, Ont.; cast iron pipe, special castings of all kinds, car wheels, iron ore, pig iron, by the Canada Iron Corporation, Limited, Montreal, Que.; engines, pumps, etc., by the Canadian Fairbanks-Morse Company, Limited, Montreal, Que.; iron and steel products, by the Dominion Iron & Steel Company, Limited, Sydney, C.B.; engineers and plumbers' brass goods, by the James Morrison Brass Manufacturing Company, Limited, Toronto, Ont.; iron and steel products, by the Nova Scotia Steel & Coal Company, Limited, New Glasgow, N.S.; gasoline engines, wood and steel tanks, etc., by the Ontario Wind Engine & Pump Company, Limited, Toronto, Ont.; enamelled baths and plumbers' supplies, by the Standard Sanitary Manufacturing Company, Limited, Toronto, Ont.; steel and iron products, by the Steel Company of Canada, Limited, Hamilton, Ont.; paints, varnishes, white lead, etc., by the G. F. Stephens & Company, Limited, Winnipeg, Man.; builders' supplies, by the Winnipeg Paint & Glass Company, Limited, Winnipeg, Man.

Reinforced Concrete Construction

The Regulations Proposed for Adoption by the City of Toronto, together with Comments by the Citizens' Committee

It will be recollected that a detailed criticism of the Toronto building code was submitted to the Fire and Light Committee of the City Council last spring by a special committee of citizens of which Mr. C. R. Young is Secretary. The entire by-law is under revision and will be completed shortly, but the first active development, so far, has been the preparation of a revised ordinance for reinforced concrete construction. This portion of the proposed new code, which is reproduced hereafter, was recently placed in the hands of the fire and light committee by the City Architect, Mr. McCallum. Following these regulations we give the criticism thereof by the Citizens' Committee. One of the particular criticisms made is in connection with the excessive requirements for bending moments. It is pointed out that in this and other respects the by-law is more stringent than the regulations adopted recently by New York, Chicago, St. Louis and other large American cities.

TORONTO'S PROPOSED BY-LAW

The Council of the Corporation of the City of Toronto enacts as follows:

1. The term "reinforced concrete" as used in this By-law is to be understood to mean an approved concrete mixture reinforced by steel of any shape so combined that the steel will take up the tensional stresses and assist in the resistance to shear, and the construction must be of such a nature that the stresses can be calculated by the accepted formulas of modern engineering practice.

2. (1) Before permission to erect any reinforced concrete structure or any structure containing reinforced concrete is issued, complete drawings and specifications, signed by the architect or engineer who designed the structure and clearly showing all details of the proposed construction, and the size, shape and position of all reinforcing rods, stirrups or other forms of metal, also a certified copy of the computations of the architect or engineer showing how the strength of the different portions of the structure was arrived at, shall be submitted to the Department of the City Architect and Superintendent of Building for examination and approval, and, when satisfactory, the approved signed drawings, specifications and static computations shall be filed in the said Department until the completion of the work, provided, however, that permission to erect any reinforced concrete structure does not in any manner imply the acceptance of the work or relieve the Architect or Engineer who designed the structure from full responsibility for the actual construction.

(2) All reinforced concrete construction shall be performed under the personal and constant supervision of either a fully qualified engineer or competent superintendent.

(3) It shall be the duty of the engineer or superintendent in charge of the work to keep an exact record of the progress of each operation, which record shall clearly show the position of and give the date of placing of all concrete and the date of removal of forms, a certified copy of which is to be furnished the Inspector of Buildings weekly, and upon the completion of the work the correctness of the records, which have been furnished weekly, to be certified to and sworn to, if considered desirable, by the person under whose constant supervision the work was carried out.

(4) Inspection by the engineer or superintendent in charge shall cover the following:

(a) The materials;

(b) The correct construction and erection of the forms and supports;

(c) The sizes, shapes, arrangement and fastening in position of all reinforcements;

(d) The proportioning, mixing and placing of the concrete;

(e) The strength of the concrete by tests of standard test pieces made during the progress of the work;

(f) Whether the concrete is sufficiently hardened before the forms and supports are removed;

(g) Prevention of injury to any part of the structure by and after removal of the forms;

(h) Comparison of dimensions of all parts of the finished structure with the plans.

(5) The execution of reinforced concrete work shall be confided to workmen accustomed to this class of construction who shall be under the control of a competent foreman, and it is to be distinctly understood that under no conditions will the engineer or superintendent in charge of the work be permitted to act in the dual capacity of both inspector and foreman.

Forms

3. (1) All forms shall be built rigid, plumb and true, thoroughly braced and with tight joints so that no appreciable part of the concrete mixture can escape, and their interior dimensions must conform to the dimensions of the concrete sections shown upon the approved plans. All forms shall be supported so as to carry the dead load of the construction as a liquid without spring or deflection, and any form that becomes twisted or warped shall be correctly adjusted before concrete is placed therein. Building paper will not be allowed in forms for any purpose whatsoever.

(2) If forms are to be hung from steel beams the hangers and the method of hanging shall be subject to the approval of the Inspector of Buildings, and no hangers that are difficult to remove shall be used.

(3) The forms for beams, girders and lintels shall be so designed that at least one side of each beam or girder may be removed without disturbing the bottom portion of the form or its supports.

(4) All posts supporting forms for slabs, beams or girders must rest upon wedges which can be loosened and removed without producing undue strains in the floor or roof system.

(5) Posts which are to be supported from the ground must be provided with footings of sufficient area to do away with any liability of appreciable settlement owing to insufficient foundation.

(6) All column forms shall have an opening left at the bottom to enable cleaning out and adjustment of the steel to be attended to, which opening is not to be closed until the column is to be poured.

(7) All shavings, chips, sawdust, ice or other foreign matter must be removed from within all forms before concrete is placed therein.

Cement

4. (1) Only Portland cement will be accepted in reinforced concrete construction and this cement must comply in all respects with the requirements of the standard specifications of the City Engineer's Office of the City of Toronto, which are as follows:

(a) The specific gravity of the cement shall not be less than 3.10. Should the test of cement as received fall below this requirement, a second test may be made upon a sample ignited at a low red heat. The loss in weight of the ignited cement shall not exceed 4 per cent.

(b) It shall leave by weight a residue of not more than 8 per cent. on the No. 100 and not more than 25 per cent. on the No. 200 sieve.

(c) It shall not develop initial set in less than thirty minutes and must develop hard set in not less than one hour, nor more than ten hours.

(d) The minimum requirements for tensile strength for briquettes one square inch in cross section shall be as follows, and the cement shall show no retrogression in strength within the periods specified:

Age. Neat Cement.	Strength.
24 hours in moist air	175 pounds
7 days (1 day in moist air, 6 days in water)	500 "
28 days (1 day in moist air, 27 days in water)	600 "
One part cement, three parts Standard Ottawa sand.	
7 days (1 day in moist air, 6 days in water)	200 "
28 days (1 day in moist air, 27 days in water)	275 "

(e) Pats of neat cement about 3 inches in diameter one-half inch thick at the centre and tapering to a thin edge shall be kept in moist air for a period of 24 hours.

(f) A pat shall then be kept in air at normal temperature and observed at intervals for at least 28 days.

(g) Another pat shall be kept in water maintained at as near 70 degrees F. as practicable and observed at intervals for at least 28 days.

(h) A third pat shall be exposed in any convenient way in an atmosphere of steam above boiling water in a loosely closed vessel for 5 hours.

These pats to satisfactorily pass the requirements shall remain firm and hard and show no signs of distortion, discoloration, checking, cracking or disintegrating.

(i) The cement shall not contain more than 1.75 per cent. of anhydrous acid (SO_3) nor more than 4 per cent. of magnesia (MgO).

(2) No cement shall be used in any reinforced concrete work unless it has been tested either at the manufactory or at some acceptable laboratory and a certified report of the test filed with the Inspector of Buildings.

(3) All such tests shall be made in not more than carload lots or in smaller quantities if so directed by the Inspector of Building, and when laboratory tests are to be made the cement shall be delivered at the job at least two weeks before it is required for use so as to allow ample time for testing.

(4) Proper care is to be taken to separate lots delivered so that they can be easily identified if found unsatisfactory, and a suitable place must be provided for the storage of all cement. No cement shall be used that has absorbed sufficient moisture to cause it to granulate or become lumpy when thoroughly dried.

(5) Any cement without the makers' name and brand on the barrel or package will be rejected without test, as will also any cement in barrels or packages bearing other than the makers' name and brand.

(6) The Inspector of Buildings may require a certificate from the manufacturer to the effect that the cement has been seasoned or [illegible] for at least thirty days before leaving the works.

(7) All tests shall be made at the expense of the contractor, and all cement or other rejected material must be immediately removed from the job and the vicinity.

Aggregates

5. (1) Extreme care shall be exercised in selecting the aggregate for mortar and concrete and careful tests must be made where any doubt exists of the materials for the purpose of determining their qualities and the grading necessary to secure maximum density or a minimum percentage of voids.

(2) Fine aggregates shall be uniformly graded from coarse to fine and consist of sand, crushed stone or gravel screenings, passing when dry, a screen having one-quarter inch diameter holes, and not more than six per cent. passing a sieve having 100 meshes per lineal inch. It shall be of clean silicious material free from vegetable loam and other deleterious matter.

(3) Mortars composed of one part Portland cement and three parts fine aggregate, by weight, when made into briquettes, shall show a tensile strength of at least 70 per cent. of the strength of 1:3 mortar of the same consistency made with the same cement and standard Ottawa sand.

(4) Coarse aggregate shall consist of inert material such as crushed stone or screened gravel which is retained on a screen having one-quarter inch diameter holes. The particles shall be clean, hard, durable and free from dust or other deleterious material, and the maximum size shall pass in any direction through a one inch diameter ring. A graduation of the size of the particles from fine to coarse will be considered advantageous.

(5) Samples of all aggregates must be submitted to the Inspector of Buildings and his approval of them obtained before being used in any work.

Reinforcement

6. (1) All steel used for reinforcement shall be medium steel made by the open hearth process, and be rolled from new billets. No re-rolled steel will be allowed. The steel shall have an ultimate tensile strength of not less than 60,000 pounds per square inch of net cross section, and an elastic limit of at least one-half of this ultimate strength, and for sizes up to ¾ inch in diameter shall bend cold 180 degrees around a diameter equal to the thickness of the piece tested without sign of fracture on the outside of bent portion.

(2) For sizes greater than ¾ of an inch in diameter it shall bend cold 180 degrees around twice its own diameter without sign of fracture on the outside, except in cases where all bends necessary in the construction are to be made hot, in which case the steel shall bend cold 90 degrees around its own diameter without sign of fracture.

(3) All material tested to destruction shall show a uniform silky fracture and all reinforceing steel shall be free from checks, cracks, flaws or other imperfections, also free from paint, oil, dirt, grease or heavy rust or scale.

(4) If deformed bars are used only the net section—the section exclusive of all projections—of the area of such bars shall be considered effective.

(5) Tests of the steel proposed to be or being used in any reinforced concrete structure shall be made at the expense of the contractor upon the request of the Inspector of Buildings, and such tests shall be made at a place satisfactory to him and under the supervision and direction of the architect, engineer or superintendent in charge of the work.

(6) A certified copy of the report of all tests to be filed with the Inspector of Buildings immediately after being made.

Mixing

7. (1) The ingredients of concrete shall be thoroughly mixed dry after which the proper amount of water shall be added and the mixing continued until the cement is properly distributed and the mass uniform in color and homogeneous.

(2) Methods of measurement of the proportions of the various ingredients, including water, in each batch shall be used which will secure separate uniform measurements at all times. The use of boxes specially constructed for the purpose will be preferred, but the use of iron wheelbarrows may, with the consent of the Inspector of Buildings, be used for measuring stone and sand.

(3) All concrete materials shall be measured loose.

(4) All concrete must be machine mixed using a batch mixer of an approved design if the amount of concrete in the work exceeds fifty (50) cubic yards. Continuous mixing machines will not be allowed.

(5) A competent foreman must be in constant attendance at the mixer to give his approval of every batch which leaves the machine.

(6) When the amount of concrete does not exceed fifty (50) cubic yards, the mixing may be done by hand on a smooth watertight platform not less than fourteen feet by twelve feet square, and having a raised rim around the edge at least three inches in height. The fine aggregate shall be first evenly spread on this platform and the proper proportion of cement shall then be spread over the aggregate when the ingredients shall be thoroughly mixed with hoes or shovels, then spread out evenly over the platform while in a dry state. Clean water shall then be applied and the cement and fine aggregate thoroughly mixed until a mortar of the proper consistency is formed which shall be evenly spread over the platform. The stone or gravel after being wetted shall then be evenly spread over the mortar and the whole mass thoroughly mixed with shovels and hoes by being turned over and worked at least three times, not counting the shovelling off the platform. No more than three-quarters of a cubic yard shall be mixed in any one batch.

(7) The materials must be mixed wet enough to produce a concrete of such consistency as will flow into the forms and about the metal reinforcement and which at the same time can be conveyed from the mixer or platforms to the forms without separation of the coarse aggregate from the mortar.

(8) Retempering mortar or concrete, i.e., remixing with water after it has partially set, will not be permitted.

Placing Concrete

8. (1) Concrete shall be deposited in the forms as rapidly as possible after leaving the mixer, and under no circumstances shall concrete be used that has attained initial set before final placing, nor shall such concrete be returned to the mixer.

(2) When placing concrete is once started it shall, if possible, be carried on as a continuous operation until the pouring of the section or panel is completed.

(3) When being deposited or poured the concrete shall be agitated continuously with suitable tools such as a straight shovel or slicing tool kept moving up and down until all the ingredients have settled to their proper place by gravity, and the surplus water has been forced to the surface. Filling the forms completely and puddling afterwards will not be permitted. In placing the concrete the work shall be so laid out that the partly set concrete shall not be subjected to shocks from men hauling or wheeling material over it.

(4) Before placing concrete care should be taken to see that the forms are constructed as hereinbefore specified for and thoroughly wetted, and the space to be occupied by the concrete free from debris.

(5) When the placing of concrete is suspended all necessary grooves for joining future work shall be made before the concrete has had time to set. When work is resumed concrete previously placed shall be roughened, thoroughly cleansed of foreign material and laitance, drenched and slushed with a mortar consisting of one part Portland cement and not more than two parts of fine aggregate.

(6) Care must be taken to stop work at such a point that the joint formed when the work is resumed will have the least possible effect on the strength of the structure. Footings shall be cast to their full depth at one operation.

(7) Construction joints in beams and girders shall be vertical and at a point midway between supports, unless a beam is located at this point, in which case the joint shall be offset at a distance equal to twice the width of the beam.

(8) Construction joints in slabs shall be near the centre of the span. No joint will be allowed between slab and beam or girder.

(9) Any concrete which may run past the bulkheads must be cleaned up and removed before the concreting of the next section is started.

(10) Where brackets are used the brackets will be considered a part of the beam or girder.

(11) All columns are to be poured a sufficient length of time ahead of the floor construction to allow the concrete in the column to properly set up. The pouring of a column must be in one continuous operation to the bottom of the beam or girder it supports and during the pouring the concrete shall be well stirred or puddled with a long rod or tamp to expel all bubbles of air and prevent voids and honeycombing. Joints in columns shall be perpendicular to the axis of the column.

(12) In slab construction the finish must be laid integrally with the rest of the slab or it will not be considered as part of the slab in calculating the strength of same.

(13) Whenever possible the edges of girders, beams and columns shall be chamfered and the sides of beams and girders splayed in order that the forms may be more easily removed.

(14) All reinforcing steel shall be accurately located in the forms and secured against displacement and the lateral spacing of the steel in lintels, beams or girders shall not be less than two and one-half diameters centre to centre.

(15) No concrete shall be poured until the engineer or superintendent in charge has examined the particular section in which it is desired to proceed with this portion of the work and has expressed himself satisfied with the structural condition and cleanliness of the forms and the placing, splicing and fastening in its proper position of the steel reinforcement.

(16) When concreting is carried on in freezing weather, the material must be heated and such provisions made that the concrete can be put in place without freezing. The use of frozen, lumpy sand or stone depending on hot water used in mixing to thaw it out will not be permitted.

(17) All concrete shall be kept at a temperature above freezing until it has thoroughly hardened, and all concrete which is frozen shall be removed.

(18) Concrete placed in warm weather, or which from any other cause is exposed to premature drying, shall be kept thoroughly wet during the first week after being put in place.

(19) Concrete shall not be placed in water unless unavoidable, but when this cannot be avoided, unusual care must be exercised to prevent the cement from being floated away, also the formation of laitance. The concrete shall also be deposited through a metallic tube or from a bucket having a bottom dump, and care shall be taken to keep the surface of the concrete as nearly horizontal as possible. The proportion of cement in concrete deposited under water

shall be 25 per cent. in excess of that required for similar work deposited in the ordinary way.

Removal of Forms

9. (1) Forms shall not be removed until the concrete is thoroughly set and is of sufficient strength to carry its own weight together with whatever live load is liable to come on the construction.

(2) No form shall be removed without the approval of the architect or engineer or the superintendent in charge of the structure.

(3) The original supports for beams and girders must remain in place for at least twenty-one days after the concrete has been poured and before these supports are interfered with, the entire forms must be removed from supporting columns and the sides of beams and girders stripped so as to enable a thorough examination of the concrete to be made.

(4) The form shall not be removed from columns in less than six days, and forms supporting floor slabs shall not be removed in less than ten days after the concrete has been poured. The sides of forms for beams and girders may be removed at the same time as the forms supporting the floor slabs.

General Assumptions

10. (1) As a basis for calculations for the strength of reinforced concrete construction the following assumptions shall be made:

(a) A plane section before bending remains plane after bending.

(b) The modulus of elasticity of concrete in compression within the usual limit of working stresses is constant.

(c) In making calculations the tensile stress of concrete shall not be considered.

(d) The steel shall take all the tensile stresses.

(e) Perfect adhesion is assumed between concrete and reinforcement. Under compressive stresses the two materials are, therefore, stressed in proportion to their moduli of elasticity and their distance from the neutral axis.

(f) The ratio of the modulus of elasticity of steel to the modulus of elasticity of concrete shall be assumed to be fifteen for concrete with a crushing strength of 2,000 pounds per square inch after hardening for 28 days.

(g) Initial stress in the reinforcement due to contraction or expansion in the concrete may be neglected.

(2) The span length of beams and slabs shall be taken as the distance from centre to centre of supports, but shall not be taken to exceed the clear span plus the depth of the beam or slab. Brackets shall not be considered as reducing the span.

(3) The dead load shall include the weight of the structure and all fixed loads and forces.

(4) The live load shall include all loads and forces which are variable.

(5) The weight of reinforced concrete shall be taken as 150 pounds per cubic foot.

Bending Moments

11. (1) The bending moment for slabs and beams when not continuous over supports, shall be taken at not less than $\frac{WL}{8}$

(2) When slabs and beams are built continuous over two or more supports, the bending moment shall be taken at not less than $\frac{WL}{10}$

(3) When slabs and beams are continuous over one support only, the bending moment shall be taken at not less than $\frac{WL}{9}$

(4) In the case of square panels reinforced in both directions and continuous over all supports, the bending moment of the slab shall be taken at not less than $\frac{WL}{20}$ provided, however, that when square floor slabs reinforced in both directions are contiguous to walls, the bending moment of the slab shall be taken at not less than $\frac{WL}{18}$

W=Total uniformly distributed load.

L=Span of beam or slab.

(5) The length of a slab in which reinforcement in both directions will be allowed for is limited to one and a half times the width. The proportion of load on a slab up to this limit which will be considered as being transferred to the side and end supports will be that obtained by using the following formulas:

(a) Load on longer supports $=\frac{L^4}{L^4+B^4}$

(b) Load on shorter supports $=\frac{B^4}{L^4+B^4}$

L=Length of span of slab.

B=Breadth of span of slab.

(6) The amount of reinforcing steel may be gradually reduced to seventy-five per cent. of that calculated per foot in width, commencing at the quarter point and continuing to the support. The reinforcement spanning the shortest direction shall be placed below the reinforcement spanning the longer direction.

(7) In all cases where reduction in the bending moment is allowed on account of continuous action, sufficient steel reinforcement must be provided in the top of the slab or beam over the support to meet the requirements of the accepted theory of flexure, and this upper reinforcement shall extend on both sides a sufficient distance beyond the centre of the support to develop adhesion equal to at least the strength of the upper bars on the basis of the allowable unit stresses.

(8) If the girders, beams and slabs are poured in one continuous operation, then the girders or beams may be treated as T. beams with a portion of the slab acting as a flange. In no case shall the overhanging width on each side of the girder or beam exceed four times the thickness of the slab and the total width of the flange shall not exceed five times the width of the girder or beam.

(9) In beam and slab construction an effective metallic bond shall be provided at the junction of the beam and slab and where the reinforced concrete girders carry reinforced beams, the portion of the floor slab acting as flange to the girder must be sufficiently reinforced with bars near the top, at right angles to the girder, to enable local loads to be transmitted directly instead of through the beams to the girder, thus avoiding an integration of compressive stresses due to simultaneous action of floor slab and girder action.

(10) In the design of T beams acting as continuous beams, due consideration shall be given to the compressive stresses at the support at the bottom of the beam.

(11) When the overall vertical distance of the tension members of a girder or beam is greater than one-sixth of the total depth of the girder or beam, the stresses in members shall be computed in proportion to the distance from the neutral axis.

(11) Shrinkage and thermal stresses must be provided for by the introduction of steel.

Proportion of Concrete and Allowable Stresses on Concrete and Steel

12. (1) All concrete for columns, girders, beams, slabs, walls, fireproofing or piles shall be composed of materials meeting the requirements of these regulations, and be mixed as hereinbefore specified, in the proportion of not less than one part of cement to two parts of fine aggregate and four parts of coarse aggregate, or in such other proportions as may be necessary to make the resistance of the mixture to crushing not less than two thousand (2,000) pounds per square inch after hardening for 28 days.

(2) Tests to determine this value must be made at the expense of the contractor when required by the Inspector of Buildings at a place and by a person satisfactory to him and under the direct supervision of either the said Inspector of Buildings or a person representing him.

(3) When the proportion of cement is increased and the quality of aggregates hereinbefore called for used, an increase may be made on the allowable working stresses proportional to the increase in compressive strength at 28 days as determined by actual tests, but this increase shall not exceed 25 per cent. On this basis the following maximum stresses for 1:2:4 concrete will be allowed in construction:

(a) Compression in extreme fibre of girders, beams and slabs, 600 pounds per square inch.

(b) Direct compression, 450 pounds per square inch.

(c) Shearing stress, when diagonal tension is not resisted by steel, 40 pounds per square inch.

(d) Shearing stress, when all diagonal tension is resisted by steel, not to exceed 100 pounds per square inch of effective cross section.

Members of web reinforcement shall be designed so as to adequately take up all involved stresses throughout their entire length. They shall not be spaced to exceed three-fourths of the depth of the beam in that portion where the web stresses exceed the allowable shearing value of the concrete.

Web reinforcement, unless rigidly attached, shall be placed at right angles to the axis of the beam and looped around the extreme tension member.

(e) For tee-beams the width of the stem only shall be used in calculating the shear.

(f) Adhesion to plain steel bars, 60 pounds per square inch of surface of bar.

(g) Adhesion to deformed steel bars, up to 100 pounds per square inch of surface of bar may be permitted.

(h) For compression in columns with not less than 1 per cent. and not more than 4 per cent. of longitudinal reinforcement, the safe load shall be computed as follows:

Safe load (in pounds)=450 (Ac+15 As).

Ac=Net cross sectional effective bearing area of concrete in square inches.

As=Cross sectional area of longitudinal reinforcement in square inches.

(i) For columns reinforced with both longitudinal steel and spirally wound hooping when the volume of hooping is equal to at least one per cent. of the volume of the enclosed concrete and the longitudinal reinforcement is not less than one per cent. and not more than four per cent. of the cross sectional area, the safe load shall be computed as follows:

Safe load (in pounds)=650 (Ac+15 As).

Ac=Net cross sectional area of concrete enclosed in hooping in square inches.

As=Cross sectional area of longitudinal reinforcement in square inches.

(4) The foregoing allowed stresses shall be used only where the unsupported length of the column is not greater than 15 times the least diameter of effective bearing area. Where the length exceeds the limit, the allowable stress shall be reduced according to approved standard formula.

(5) Bending stresses due to eccentric loads on columns shall be provided for by increasing the section of concrete or steel until the maximum stress on a column will not exceed the allowable working stress.

(6) The least diameter of effective bearing area is to be understood to mean the distance from inside to inside of hooping in columns with spiral hooping, and in others from outside to outside of longitudinal reinforcement.

(7) The pitch of spiral reinforcement shall not be greater than one-sixth of the effective diameter of a column, and in no case more than three inches, and adequate means must be provided to hold it in place so as to form a column, the core of which will be straight and well centred.

(8) When columns are reinforced with longitudinal rods only, the reinforcement shall be tied together with bands, having an area of not less than one-sixteenth of a square inch, placed not more than the effective diameter of the column apart or in any case not more than twelve inches. The bands to be jointed in such a manner as to do away with any liability of the reinforcement spreading, and shall be wired to each longitudinal rod.

(9) The percentage of reinforcement in any column, regardless of the load carried by it, is not to be less than one per cent. of the effective cross sectional area. Reinforcement to be in all cases placed at corners of square or rectangular columns, the minimum size of which shall be 9-16 inch round or 1-2 inch square steel rods.

(10) No column shall have less than sixty-four square inches of effective area or a dimension of less than eight inches.

(11) When longitudinal reinforcing rods in columns have an area in excess of one and one-fourth square inches the ends shall be faced or milled off normal to the longitudinal axis and such rods shall have full and perfect bearings and a tight fitting sleeve or other approved appliance shall be provided at each joint to keep the rods in their proper position.

(12) When longitudinal reinforcing rods in columns have an area of less than one and one-fourth square inches the rods may be lapped and securely wired together, the splice to be of a sufficient length to develop by adhesion the strength of the rod.

(13) All butted joints shall be made at the floor levels or at points where the columns may be considered as fixed, and the centre of lapped joints shall not be more than one foot above floor levels or points at which rigid lateral support is afforded the columns. The ends of all rods at the base of columns shall be made smooth and right angled from the longitudinal axis and such rods shall have a perfect bearing on a steel plate or casting of sufficient size and strength to distribute the load which the column supports to such an extent that the allowable compressive stress per square inch on the material under this plate shall not be exceeded, or in lieu of the plate the stress may be distributed in concrete footings to the required extent by means of dowels of sufficient length and area to sustain the weight by adhesion of the concrete to the steel, without exceeding the specified limit for such in this regulation. The tops of all dowels to extend to the top of the footing and be made perfectly level and smooth to receive the longitudinal reinforcing rods and the joint between the dowels and the rods to be made with a pipe sleeve which is to be grouted into the footing at least six inches and extend six inches above

the top of same and the reinforcing rods after being secured in their proper position are to be solidly grouted into the sleeves with liquid Portland cement.

(14) The area required in footings which have to support columns having both spiral hooping and vertical reinforcement only. The longitudinal reinforcing bars in all columns shall be straight and sufficient metallic lateral support shall be provided to keep them in their proper place until the concrete in the column has set.

(15) The allowable stress on steel in tension shall be sixteen thousand pounds (16,000) per square inch.

(16) Where it is necessary to introduce steel to resist compression in girders, beams or slabs, the compressive stress per square inch allowed on such steel shall not exceed fifteen times (15) the computed compressive stress in the concrete at the same distance from the neutral axis. All such steel shall be anchored into the mass of concrete in such a way as to prevent any possibility of buckling.

13. The minimum protection for steel reinforcement, which is to be taken, is the distance from the surface of the steel to the nearest concrete surface, shall be:

(a) For girders and columns, two inches.
(b) For beams and lintels, one inch and a half.
(c) For floor and roof slabs, one inch.

Plain and Reinforced Concrete Walls

14. (1) Concrete walls without reinforcement, other than those of foundation or basement, shall be constructed with concrete of the same composition and quality in all respects to that hereinbefore specified for reinforced concrete, and shall be the full thickness prescribed in this By-law for brick walls.

(2) Buildings having a complete skeleton construction of steel or of reinforced concrete construction or a combination of both, may have exterior walls of reinforced concrete at least eight inches thick; provided, however, that such walls shall support only their own weight, and that such walls shall have both vertical and horizontal steel reinforcement on both sides, the rods to be placed not more than eighteen inches apart from centres, and be securely wired together at each intersection and rigidly connected with columns and girders. All rods shall be lapped a sufficient length to develop their full stress by the allowable unit stress for adhesion. Additional rods shall be set around openings, the vertical ones to be wired to the nearest horizontal ones, and the horizontal rods at top and bottom of openings wired to the nearest vertical ones. In all cases the percentage of steel reinforcement to be provided shall be sufficient to enable the wall to safely resist a uniformly distributed horizontal pressure of thirty pounds per square foot acting on either side of it, but in no instance shall the percentage of reinforcing metal be less than one-quarter of one per cent. in each direction. The thickness of a reinforced concrete curtain wall shall not be less than one-eighteenth of the unsupported height.

Tile and Reinforced Concrete Joist Construction

15. (1) When tile and reinforced concrete joist construction is used for floors, the tile shall be sound, hard burned, free from shrinkage cracks, of uniform size and corrugated in a horizontal direction upon the sides.

(2) The reinforced concrete joists shall be parallel and in perfect line and of sufficient width to develop the steel, which steel is to be protected from fire with concrete of a similar mixture and thickness to that hereinbefore specified for concrete beams. Should concrete be required on the top of the tile to take compressive stress it must be not less than two inches in thickness and must be poured at the same time as the joists, and be of the same mixture. The tile shall be thoroughly soaked with water before the pouring of the concrete is commenced. In this class of construction the dead and entire live loads will be assumed to be carried by the reinforced concrete joists.

16. Upon the completion of a reinforced concrete building the architect or engineer who designed the structure shall issue a signed certificate and have the same posted in a conspicuous place on each floor, stating the safe capacity per square foot of floor space, if the entire floor is designed to carry the same load. If, however, the floor is designed to carry different loads, each section must be provided with a certificate stating the capacity of that particular section and describing the limits thereof.

17. Load tests shall be made by and at the expense of the contractor when required by the Inspector of Buildings, under his direction and in his presence or in the presence of his representative, on any portion of a reinforced concrete structure within a reasonable time after erection. Such tests shall show that the construction will sustain a load of twice the live load for which it was designed without causing any permanent deformation.

18. No system of reinforced concrete shall be used which is not capable of design and investigation in accordance with the formula and principles laid down in these regulations.

19. Section 111 of By-law No. 4861, being "A By-law for regulating the erection and to provide for the safety of buildings," is hereby repealed.

COMMENTS UPON THE PRECEDING MEASURE MADE BY THE CITIZENS' COMMITTEE

Toronto, May 21st, 1912.

To the Fire and Light Committee of the City Council, and the City Architect of Toronto.

Gentlemen:—

While the proposed By-law for regulating reinforced concrete construction in the City of Toronto is in the main satisfactory to the Citizens' Committee on the revision of the Building By-law, there are certain provisions to which exception is taken. In the opinion of this Committee these should be amended before the proposed ordinance become law, if it is to represent the latest and best constructional practice.

To this end, the Committee wishes to make the following comments on the draft By-law, and offers corresponding suggestions for its improvement:

Inspectors' Reports.—Section 2, sub-section 3, page 2.—It would appear from this that the weekly reports furnished the Inspector of Buildings are to concern only the records of the progress of concreting and the date of removal of forms. In the opinion of the Committee, it should be required to include also a declaration that, in the opinion of the inspector in charge, the work covered by the report has been executed in all respects in accordance with the plans, specifications and city building regulations.

Test Mortars.—Section 5, sub-section 3, page 7.—It is now recommended by the best authorities that test mortars shall show, not merely 70 per cent., but 100 per cent. of the strength of a similar mortar made with standard Ottawa sand.

Reinforcement.—Section 6, page 8.—The [illegible] prohibition of Bessemer steel, high-elastic limit steel and rerolled steel for reinforcement, is in the opinion of this Committee not warranted. If these materials are capable of passing the usual tests prescribed for them, their use should be allowed. Suitable tests for high elastic limit steel should be inserted in the By-law.

Volume of Cement.—Section 7, sub-section 3, page 10.—In the interests of definiteness the [illegible] ment should be defined and the Committee recommends that this be fixed at 9/10 of a cubic foot.

Pouring of Columns.—Section 8, sub-section 11, page

11.—The maximum length of time which columns should be poured ahead of the floors should be defined.

Bending Moments.—Section 11, page 16.—The bending moments for slabs and beams fixed by this section are in excess of those required to be figured in the newer building codes of large American cities. With the careful inspection provided for in the regulations under discussion, it would, in the opinion of this Committee, be entirely safe to reduce these requirements to conform to those recently adopted by the cities of New York, Chicago, St. Louis, Minneapolis and San Francisco. It is therefore recommended that for slabs and beams continuous over two or more supports the moments at the centre and at the supports be taken as 1/12 W1 and that for slabs and beams continuous over one support only, the moments shall be 1/10 W1. Corresponding alterations should be made and in sub-section (4) to cover slabs reinforced in both directions and in sub-section (7) to conform with the above rules.

Reduction of Slab Reinforcement.—Section 11, sub-section 6, page 18.—The reduction of reinforcing steel in slabs here prescribed is not in accordance with accepted theory. It is recommended that the steel be reduced at the support to 50 per cent. of that calculated per foot of width and that the reduction begin at the third points instead of at the quarter points.

T-flange.—Section 11, sub-section 8, page 18.—Where the slab extends on only one side of the beam, it should be allowed as flange up to four times its thickness.

Compression at Support.—Section 11, sub-section 10, page 19.—It is almost universal practice to allow compressive stresses at the bottom of a beam at the support, fifteen per cent. in excess of those allowed elsewhere in the beam. This should be permitted in the present regulations.

Working Stresses.—Section 12, sub-section 3, page 20.—The allowable working stresses prescribed in this sub-section are lower than those permitted in the most recently adopted building codes of American cities. It is recommended that the compression on the extreme fibre of slabs, beams and girders be 650 pounds per square inch. The corresponding stress in the codes of New York, Chicago, St. Louis, Minneapolis and Cleveland runs from 650 to 800 pounds per square inch. For direct compression, the specified stress of 450 pounds per square inch is also lower than is now generally adopted. It is recommended that this be placed at 500 pounds per square inch, the same as permitted in New York, St. Louis, Cleveland and Baltimore. The formula for safe loads on columns, paragraph (h), should be correspondingly changed.

Effective Area of Columns.—Section 12, sub-section 6, page 22.—It is exceedingly severe, and beyond the present requirements of the City Architect's Department to allow as effective diameter of a longitudinally-reinforced column only the distance from outside to outside of reinforcement. Were this rule adopted it would mean that a 10 inch by 10 inch column would have an effective area of only 36 square inches, or 36 per cent. of its area. It is customary to allow the full area in this class of columns. Sub-section 10 on page 23 should be altered to read, "Sixty-four square inches, outside area."

Banding for Columns.—Section 12, sub-section 8, page 22.—For bands in columns having longitudinal reinforcement only, one-quarter inch rounds should be permitted spaced not farther apart than the outside diameter of the column. Since such material is of the nature of wire, and therefore very easily worked, its use should be allowed as tending to ease and rapidity of construction.

Splices.—Section 12, sub-section 11-13, page 23.—In sub-section 11, it should be made clear that the area of one and one-fourth square inches is of individual rods and not the aggregate area. For rods having an area less than this, it should be allowable to use a pipe-sleeve joint without milling the ends of the rods, as an alternative to the lapped splice prescribed. Where columns require to be reinforced for moment due to wind, it should be allowable to locate the splices at other places than at the floor levels.

High Elastic Limit Steel.—Section 12, sub-section 15, page 24.—There is no good reason why the use of high elastic limit steel should be prohibited. It should be allowed to be stressed up to one-third of the elastic limit, but not over 20,000 pounds per square inch.

Reinforced Walls.—Section 14, sub-section 2, page 25.—The amount of reinforcement here required is excessive. Steel enough to resist a pressure of 30 pounds per square foot on either face of the wall is all that is necessary.

Tile.—Section 15, sub-section 1, page 26.—Provision should be here made for concrete tile or other fillers than terra-cotta tile.

New Systems.—Section 18, page 27.—This would technically debar the use of any new system of construction without amendment of the By-law and therefore should be omitted.

Formulas.—It is recommended that for definiteness and convenience the values of R in the equation $M—Rbd^2$ be listed in the By-law for working stresses from 16,000 to 20,000 pounds per square inch, as indicated in the Memorial presented to you in May last, section 18, page 52. Further, it is requested that the moment arm be defined as 0.87 times the distance from the top of the beam to the centre of the steel for both rectangular and T-beams.

Respectfully submitted,
C. R. YOUNG, Secretary.
W. C. PHILLIPS, Chairman.

Cost on Small Contracts

By E. F. Ryan

An accurate estimate of the material required for the proposed work is first made out in duplicate, the carbon copy remaining permanently in the book.

It is generally better to make out separate estimates for the material furnished by different lines of business, as for lumber, hardware, painting, etc.

If any of the labor is to be sublet, it is also made out in this way and in the absence of plans, a short description of the work and material required, if any, is given.

The name of the person for whom the work is to be done is also written on the estimate and those giving prices are instructed to put this name on also. This keeps the material of one job from being confused with another, where the contractor has several jobs on hand at once.

The estimates being carefully prepared, the perforated leaves are detached and given out for figures, labor or material as the case may be, and are returned as soon as prices are given on the material or labor, they are written on the carbon copies remaining in the book.

These, together with the cost of day labor, which should also be estimated in this same book, although a copy need not be made of it, form the basis of the price to be made on the building or contract.

If the business is secured, the loose leaves are used to check the material as it is delivered and for reference by the workmen; if the job is not secured, the price at which it was let could be entered in the estimating book for future reference, giving an idea of their competitor's figures on work to come up later.

In delivering an estimate, it is well if all of any one item could be placed on the ground at one time, thus if there is 100-2/4-16, it is much easier to check them at one delivery than several deliveries. Of course, this cannot be done with perishable material or where room is limited.

The dimension and sheathing, if possible, should all be at the building site before the carpenters begin work. These could be piled by the draymen so that they could be counted in a few minutes.

It is better to have the material delivered in as large loads as possible, as aside from the saving in drayage it is easier to check one large load than several small ones and with a little forethought this can almost always be done.

Where a few pieces are sent by a dray, the tendency is to forget to check it off at all. At first most contractors check up the deliveries quite carefully; as the work advances, many become more and more careless and in the end the inaccuracies are so apparent that the whole time spent in checking is wasted as in case of dispute it would not stand in court. Where extras are needed, it would be well to make as few orders as possible by looking well ahead to see what is needed. These could be written on a small account book, the leaf torn out, and sent to the material man, then returned with the material and filed for future reference. An account should be kept of all material returned and in this same small account book.

Where men are employed by the hour they write out their time checks for signature and on the back of the check is the number of hours and the job or jobs on which the work is done. Payments for material are made by cheque and the job on which the payment to be applied is also written on the cheque. At the completion of the contract, statements from the firms furnishing material are requested. These are checked and errors, if any, are corrected. The amount of the various statements are placed in the duplication book with their estimated cost for future reference. The checks for labor are handled in the same way. The cost of labor furnished by the different trades are totalled and placed with their estimated costs for future reference.

Accounts handled in this way take no bookkeeping work at all. The checks and statements show the entire transaction, how much and for what. The small contractor who works with saw and hammer himself cannot keep books where much bookkeeping work is to be done. In theory it seems possible and perhaps is possible, but in practice, not one in a hundred would keep an accurate account year in and year out, or on even one job.

In a vast majority of cases, the material men will furnish more accurate bills without any checking than will the average small contractor, who undertakes to work and do his own bookkeeping. However, it is desirable for the contractor to count and see that he gets what he pays for, as all men make some mistakes and some, if not watched, would be dishonest. Where a contractor works himself, the simplest and easiest way is best, because if there is much work or complication about the book work, it will be neglected.

As outlined above, this work is done mostly by the material men, and workmen, leaving the boss to simply verify their accounts.—National Builder.

It is announced by Mr. N. Curry, President of the Canadian Car & Foundry Co., Ltd., Montreal, that the establishment of a plant at Fort William, Ont., has been definitely decided upon, and that work will be begun on this plant (the cost of which will be in the neighborhood of a million dollars) about the month of August. This will be the Canadian Car & Foundry Company's fourth plant and, when completed, will give employment to a thousand men. The Fort William organization will provide for a yearly output of seven thousand cars of wood and steel. The plant will be between the Canadian Northern and Grand Trunk Pacific, while it will also have connection with the C.P.R., all three transcontinental systems having lines built into the proposed work. The city of Fort William has given a free site, including dock terminals and a partial exemption of taxation has also been granted by the municipal authorities for a period of ten years.

Vigorous Construction on the G. T. P., West of Edmonton

According to the forecast of the sub-contractors for Messrs. Foley, Welch & Stewart, under whose care the whole programme of construction on the Grand Trunk Pacific west of Edmonton is being carried out, steel will be laid on the main line as far as Tete Jaune Cache, at mile 53, B.C., by July 1. Before the road can be completed to this point the tunnelling from mile 47 to a point about 2,000 yards west must first be finished. Here is the heaviest work on the whole grade and from 1,000 to 2,000 men have been engaged for months on the task of blasting a tunnel through the solid rock. This undertaking once accomplished the contractors will make fast headway down the Fraser Valley and before the close of the construction season will have reduced to comparatively insignificant figures the distances separating gangs on the road working from east to west. Throughout the summer months 24 steam shovels will be at work in the valley west of mile 53, and sub-contractors state that the actual amount of grading done and mileage of steel laid will be considerably in excess of the records of either of the two preceding years. At Resplendant, B.C., where the steel gangs laid down their tools at the end of the active season last autumn, track-laying will also commence in less than a fortnight's time. The steel bridge crossing the Skeena river will, it is expected. be finished about July 1 and trains will then be running into New Hazelton from Prince Rupert. It is understood that Fort George will this summer become the distributing centre and permanent location of Messrs. Foley, Welch & Stewart, and sub-contractors. Among the railway men who have already signified their intention of making their headquarters there are Mr. A. E. Griffiths, who has the contract for construction from the Fort to Burns Lake and will start building west this fall, and Mr. Fetters, who has charge of all construction and engineering work on that division. Vigorous construction work will be under way east, west and south of Fort George as quickly as supplies and equipment can be assembled there. The Grand Trunk Pacific will, it is expected, open the line to traffic as far as Fitzhugh by midsummer and passengers will have little difficulty in getting through Tete Jaune Cache to Fort George.

The question of public corporations tearing up streets has again come up in Montreal. The Light, Heat and Power Company want to open up several streets which have been recently paved for the purpose of laying conduits, and as there is no by-law to prevent the company from so doing, Mr. Janin, the chief engineer, suggests that the charter should be amended in order to regulate this cutting up of the streets. At present, in order to avoid duplication of work, the road department sends notices asking for the names of streets where they propose to carry on their work and at the same time forwarded lists of streets which are to be paved.

On May 22nd the formal ceremony of turning the first sod in the construction of the St. John Valley Railway was performed at Woodstock, N.B., by Premier Flemming at the invitation of the Quebec Contracting Company. It is understood that the Quebec Contracting Company's contract calls for them to have their part of the work done by September, 1913, and the St. John & Quebec Railway Company will then have from that time until November, 1913, to get the line in readiness for operation.

Interesting Operations in the West

The accompanying views of the Leader Building and the Broad Street Subway at Regina are furnished by the contractors, the Parsons Construction & Engineering Co., Ltd., of that city.

The Leader Building, which is now nearing completion, will cost in the neighborhood of $150,000 and when finished will be one of the finest newspaper and office buildings in Western Canada.

The Broad Street subway now under construction will connect the north and south parts of the city, running under 19 tracks of the C.P.R. and C. N.R. When completed this will be the largest subway in Western Canada. It will be more than a quarter of a mile long, with a clear width of 66 feet between the walls. The contractors were unable to resume operations until quite recently owing to the recent heavy rains. The cost of this subway, when completed, will be in the neighborhood of $250,000. The work necessitates the tracks above being trussed with temporary bridges. Two tracks for street cars will run through the subway. The floors will be of reinforced concrete and the bridge work of steel. The Canadian Railway Commission authorized the construction of this subway at the joint expense of the Canadian Pacific Railway Co. and the city of Regina. The work is under the supervision of W. T. Daniels C.E., and is being carried out by the Parsons Construction and Engineering Co., of Regina. It is expected that this subway will be completed by August 1, 1912. Its construction was rendered necessary by the rapid growth of the city which caused a congestion of traffic in the vicinity of the railway yards. The first subway, known as the Albert Street subway, was built two years ago by the Parsons Construction & Engineering Company.

Leader Building, Regina, under construction

Work in progress on the Broad Street Subway, Regina

The Parsons Company are at present engaged in the construction of a warehouse for the Cockshutt Plow Company, estimated to cost $150,000. This building is being constructed of brick and lumber and will be the largest agricultural implement warehouse in the province. The Government Telephone Exchange in Saskatoon has just been finished by the above company who are also erecting a dairy building for the Dominion Dairy & Produce Co.; a $30,000 residence for Mr. E. D. McCallum, of Regina; and numerous other jobs ranging in value from $10,000 to $25,000.

Diversion and Spill Dams—Southern Alberta Land Company's Project

THE project of the Southern Alberta Land Company, Limited, undertakes the reclamation of a tract of 400,000 acres of semi-arid land located in the triangle whose apexes are Calgary, Medicine Hat and Lethbridge. Work was commenced in 1908, and a portion of the tract will be put on the market this season.

The intake diversion dam and spill dams are located on the Bow River, 25 miles south-east of Calgary. The water is carried from there 46 miles in a canal to Snake Valley, from which has been created, by means of dams at either end, a great reservoir 22 miles in length with a capacity of 365,000 acre feet. This reservoir is the largest in Canada, and ranks among the great reservoirs of the world. From the South Dam of this reservoir, which has been named Lake McGregor, the water is carried 51 miles before it touches the company's tract, making the feeder canal, inclusive of reservoir, 119 miles. On the fifth mile of canal is a 62-foot cut, from which have been removed nearly a million and a half cubic yards. The work includes on the tract of the company several hundred miles of canals and ditches. There are two great inverted syphons on the works. One across the East Arrowwood creek, a double line of wood stave pipe, 7 feet 6 inches in diameter and 1,200 feet long, has already been constructed; and one proposed, a single line of wood stave pipe, 8 feet in diameter, 6,500 feet long, carrying 1,200 second feet, under a head of 200 feet across the Bow at a point 155 miles from the intake.

The purpose of this article is to describe particularly the diversion and spill dams and their construction.

There are three structures. The first consists of an earth dam 1,800 feet long across Johnston's Island; the second, a concrete spill dam 526.5 feet long across the small channel of the Bow; and third, a concrete diversion dam 516 feet long across the main channel of the Bow. On the south bank of this channel is located the intake structure, consisting of five 8 feet by 10 feet stony gates and two stony sluice gates. The diversion and spill dams are ordinary gravity dams reinforced longitudinally with steel rails. It was necessary in designing them to provide suitable protection to permit ice to go over them without injury to the structure. This was accomplished by bending 60 pound rails into the curve of the crest, and inserting them into the concrete every five feet. The downstream slope was protected in a similar manner.

The crest of the earth dam is 11 feet higher than that of the diversion and spill dams. This will permit the latter to carry a flood flow of 130,000 second feet before overtopping the earth dam, and, inasmuch as the greatest flood flow ever known at Calgary is 54,000 second feet, and between there and the dam site the greatest additional amount that may be expected to flow into the Bow River is 20,000 second feet, it is considered that there is little danger of the waters ever going over the earth dam. This dam is covered with 6 inches of gravel, and the upstream slope, which is 1½:1, is rip-rapped and grouted.

The construction of the concrete spill dam across the small channel of the Bow and the earth dam began simultaneously. No particular difficulty was experienced with this portion of the work. The foundation of the former is an excellent blue clay, and the work was pushed through without mishap.

The foundation of the diversion dam across the main channel of the Bow was of coarse sand and boulders. This made it necessary to carry an apron downstream, and to prevent undermining under the apron a row of United States sheet steel piling was carried across the channel under the toe. An apron was carried also 11 feet upstream, and a toe wall 4 feet deep put in at that point. The foundations were placed without difficulty, and the work on the dam proper was carried on from both sides of the stream, with the idea that, when the two sections were to be brought together, the water would be disposed of by turning it through the intake into the canal and through the sluice gates. As a further guard against the water, a log crib was constructed upstream from the opening, and this was carefully banked on the upper side with rocks and earth.

The chief engineer recommended that the apron below the sluice gates be entirely completed before the water be turned through them, but for some reason this recommendation was not followed. Consequently, when it was necessary to bring the two sections of the dam together it was discovered that the toe of the sluice gates was washing out, and that unless the gates be closed very soon the foundation would be seriously undermined. Accordingly the sluice gates were closed, leaving only the five intake gates, which were four feet above the elevation of the sluice gates, to take care of the water. This proved to be insufficient provision, and soon the water was at the crest of the diversion dam, and rushing through the opening, in spite of the crib above it.

This water made it necessary to deposit the concrete by some method other than the ordinary, as the cement would wash out immediately it was put in place. Accordingly the work was carried up above the crest by piling sacks containing concrete on top of one another in the opening. This turned the water from the opening, and permitted it to spill over the completed portion of the diversion dam. The forms for the remaining portion of the dam were constructed on either side of the sack wall, and the concrete deposited in the usual manner.

Progress of Good Roads in Saskatchewan

Construction and Maintenance Fundamental Principles Criticism of Present Methods What the Movement Means to the Province in $$

By R. O. Wynne Roberts, M. I. C. E., Regina

THE construction of new roads and general improvements are eminently important matters, for they open out new territories, bring communities into more intimate relationship with each other, dissipate isolation and enable commercial and social intercourse to increase among the people. The making of new roads or the improving of them, should, however, not be considered as the final duty imposed on public authorities. Maintenance of roads is equally important, for no matter how perfect the roads are made or improved, they will soon relapse into worse condition than they were originally if they are not carefully maintained. An idea sometimes prevails that it is too costly, it means more taxes, and farmers living some distance from the main roads begrudge paying the expenses as he may not be using them, and as he has a vote he counts. Efficient maintenance is true economy, it is the best exhibition of broad and generous public spirit, it reflects to the credit of all concerned, and breeds a sense of loyalty and creates a spirit of emulation. No municipality cares to be thought inferior in public enterprise to its neighbor, so the movement, rightly directed, expands until the locality is known by the excellence of its roads.

The question that naturally follows is, how can the road be maintained in good condition? The public works department has issued directions which, if carefully observed, would lead to better roads. There are, however, one or two points which will be referred to later on in this connection. Unfortunately, there is not a supply of suitable stone in Saskatchewan for road-making, and consequently, pending the development of the financial resources of this province to warrant the importation of stone, local materials must perforce be employed—that is, clay, sand and gravel.

There is no need to mention how clay roads are converted into quagmires after rains, how the progress of even light vehicles is retarded, how time spent on a journey is doubled and how disagreeable such a journey becomes.

Proper Drainage Fundamental

Drainage of the foundation and surface of roads is most essential. It is acknowledged by capable engineers that macadam roads resting on damp foundations are neither satisfactory nor economical. The strength of a road depends largely on the quantity of moisture held in the foundation; wet ground will keep a road in a soft, resistent condition. Moreover, the writer found that wet, clayey foundation of macadam roads always works its way through the road crust and rendered it weak, dirty and expensive to maintain. The axiom should be: Keep the foundation dry. The road will bear greater weight without disintegrating, it will cost less to maintain and will give greater satisfaction to all users. Therefore, drainage is both essential and leads to ultimate economy. Where the ground is wet it should be well drained.

Clay in this district is the result of glacial formation, it consists of decomposed feldspar, etc., with or without sand and gravel. It has doubtless been observed that in dry weather it cracks by contraction owing to the evaporation of the moisture contained in the clay, and when it absorbs moisture again it expands. This characteristic of clay can, to some extent, be counteracter by mixing sand and gravel with it. Clay roads are to be found in other countries and carry heavy traffic. Clay in the vicinity of Regina is virtually of one texture, and it is possible by careful experiments to ascertain what proportion of sand and gravel would be necessary to improve such roads. The object of applying sand and gravel is to destroy the natural adhesiveness of clay and also to utilize its cementing properties. Such methods of improving clay roads have been tried and found successful, but it must not be assumed that this can be attained by rough roads. The method adopted in the States to thoroughly mix the clay and sand consists in plowing or harrowing the road surface to a depth of about four inches until it is pulverized as completely as possible. It is then covered by six inches, more or less, of clean sand on the sides, and, say, eight inches on the centre. The materials should then be mixed while they are in a dry state, and again puddled with a harrow after a rain. When an excess of clay works to the surface it tends to make the mixture sticky, so more sand should be applied until this trouble is overcome. When mixing and puddling is completed the road should be shaped while it is still soft with a scraper or a road drag, and also rolled. After such a road is made it is highlv necessary to keep in order, at any rate until it has become consolidated.

Criticism of Present Methods

The Public Works Department instructions concerning making roads on loose sand may be open to improvement. The paragraph states that after "first levelling and flattening the roadbed to a proper width and leaving no ditches whatever, so that it will remain as moist as possible. On this prepared roadbed a layer of at least nine inches of stiff clay should be deposited with a slight crown. A finish of a few inches of gravel will protect the clay from rutting, but there is not much of a tendency to rut on an ordinary clay road, as the sand affords almost perfect drainage and no excess of water ever collects."

Now, too moist a subsoil will keep the clay soft and unsatisfactory, no definite or approximate mixture or proportions of clay is suggested. It is necessary to drain wet sand and also to thoroughly mix the clay and sand by plowing and harrowing or by some other effective method.

If the Public Works Department were to lay out one mile stretches of road built as suggested above, in different parts of the country, such examples would serve as object lessons and would soon be copied if they were found to be satisfactory. Such a practice, although not with the same materials, has been tried in Ontario, and I am informed on good authority that the bulk of the farmers have been converted to the new methods of road-making and maintenance.

It cannot be expected that the traffic alone can pack clay and sand roads without constant attention on the part of the roadmen. Ruts will require to be filled with the same material.

When improved roads are made it will be necessary to prohibit the use of spikes on the driving wheels of traction engines, or it will be useless to undertake the making of such roads. With reference to motor cars and commercial motor wagons, it must be acknowledged that they have come to stay. There are now 2,095 cars in Saskatchewan. Every measure of road improvement will tend to the adoption of commercial motor cars for the conveyance of goods about the country, as is done in other countries, to the great advantage of all.

Some parts of the province, I believe, are troubled with drifting sand. May I suggest the planting of sand willows and Virginia creepers as means to bind the sand? It will, of course, be useless to carry out the planting of such plants on a small scale, because, during gales they may be buried unless steps were taken to prevent it.

With regard to the width of the roads, it is evident that 16 feet roads with ditches on either side are scarcely wide enough. It often occurs that two wagons, say, loaded with hay, meeting on such roads, find it difficult to negotiate a passage. One driver usually watches for a spot where he can turn aside with safety to allow the other wagon to pass, otherwise loads are upset. On dark nights it is not so easy to arrange this. Ten feet allowance is a comfortable one for each vehicle, and a multiple of ten feet would constitute a fair width to work upon, so that 20 feet should be the minimum on busy roads. Some roads have high crowns which render it uncomfortable, if not unsafe, for top heavy loads to travel anywhere but along the centre.

With reference to hills, it is a good policy to limit the grades to five feet in every 100 feet; where the natural slope is greater then it is necessary to make a cutting or a detour.

Narrow tires are destructive to clay roads, in the same manner as Chinese barrows wheeled on the tilt, and therefore on the edge of the wheel, destroys the hardest macadam roads in Shanghai and Hong-Kong. When clay is softened by rain the narrow tires act like knives and sink into the body of the road. When the clay-sand road is made and the surface is hardened, then it is quite possible that the damage done will be much less. There are about 170 municipalities organized in this province, and each has the entire control of roads in their districts, and, incidentally, it may be stated that they have the power to plant trees on such roads, which, if carried out, would lead to beautifying the country such as imagination only can conceive.

A Great Saving

Saskatchewan now has about 90,000 farmers, and it is estimated that last year they produced 92 million bushels of wheat, 103 million bushels of oats, 6½ million bushels of barley, 5 million bushels of flax —total, 206½ million bushels, valued at $92,000,000.

Assuming that 56½ bushels of oats, etc., were consumed on the farms, there is left about 15,000,000 bushels, which had to be conveyed over the roads.

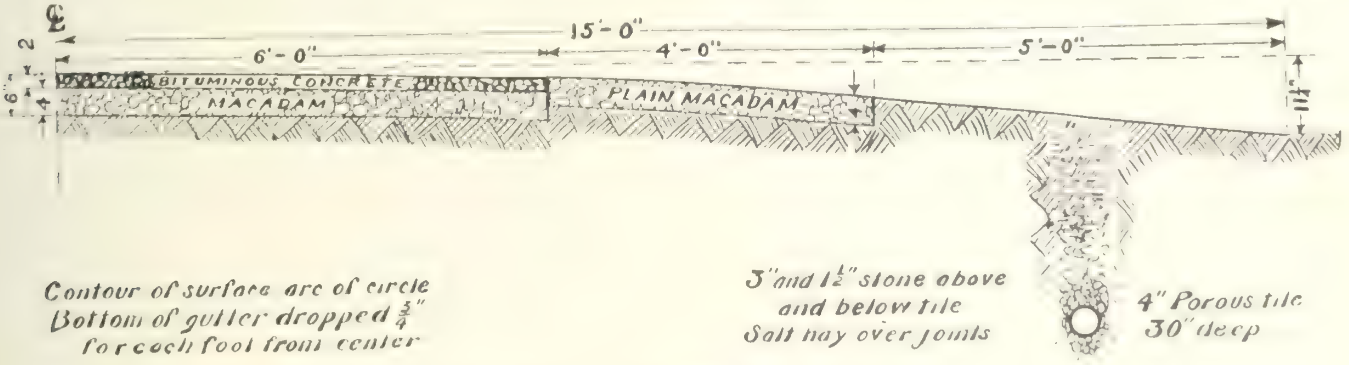
Allowing the ordinary weights per bushel of each kind of grain, and an average load per team of, say, 3,600 pounds, then it will be seen that the total number of loads conveyed over roads amounted to the respectable figure of 2,000,000.

Although competent authorities have estimated the average haul to elevator or station at eight miles, I prefer to fix it at, say, four miles. A team can therefore make two trips per day. The actual cost to the farmer for keeping teams, etc., may be about $3.20 per day, therefore each load costs about $1.60. It will consequently be seen that the total cost of hauling Saskatchewan grain amounted last year, assuming the whole crop was disposed of, to about $3,200,000. If the haulage average is more than four miles, the cost would, of course, be still greater. Now, if there were good roads, it would be possible to increase the load per team to, say, 6,000 pounds, which would reduce the number of loads to be hauled, and the cost would be about $2,000,000. In other words, the farmers would be $1,200,000 in pocket, or they could invest that amount in payment of debentures issued for road improvements. This amount, capitalized at 5 per cent., would represent a possible expenditure of $24,000,000, which would suffice to improve 24,000 miles of roads. It must be noted that the above saving represents the economy on one year's farming operation, if good roads were general throughout the province, and the following year's earnings would represent actual cash in pocket.

A Proposed Combination Type of Road Improvement

By R. A. Meeker

THE question is being asked on every side, "What is the best pavement for our country roads, especially those that are subjected to a mixed motor and horse-drawn traffic?" The answer to the question embraces several factors. These may be summarized under three general heads, viz., utility, durability and cost. The most useful pavement is best described by the phrase coined at the close of the eighteenth century by the framers of the original turnpike acts, that is, it must be smooth, hard and convenient for travel at all seasons of the year. A pavement that meets these requirements leaves nothing to be desired.


℄
15'-0"
6'-0"
4'-0"
5'-0"
2
6
4
BITUMINOUS CONCRETE
MACADAM
PLAIN MACADAM
11"
Contour of surface arc of circle
Bottom of gutter dropped $\frac{3}{4}$" for each foot from center
3" and 1½" stone above and below tile
Salt hay over joints
4" Porous tile 30" deep

Typical Half Section of Modified Type of Road Pavement

In New Jersey we have an abundance of good road material in certain sections, while in others it is lacking. The gravel in some portions of South Jersey makes an excellent road for nine months in the year, if the travel is not too heavy. The trap and dolomite of the central and northern sections makes a good road at all seasons, but they have two bad qualities, one that they become dusty in dry weather, the other that they break up and rut under heavy travel. To overcome these two evils various bitumens have been used, and the results, when the proper materials were employed, have been satisfactory except that the surface is slippery in cold weather. To overcome this objection it is proposed to build our trunk lines as follows: Pave the 12 ft. in the centre of the road with a mixture of stone and asphalt and on each side of this lay a plain macadam pavement 4 ft. wide by 4 ins. deep. In slippery weather on a road of this sort the horses can travel on the stone on each side, allowing one wheel of the wagon to run on the bituminous pavement if the driver so desires, and leaving sufficient room for an automobile to run on the center. By following this method three ends would be attained: First, the horses would be able to travel over the road without slipping; second, a more satisfactory and wider pavement would be had for less money, and third, there would be less obstruction to traffic. A bituminous pavement 16 ft. wide would cost more per mile than a combination pavement 20 ft. wide built as above suggested, and, as an added advantage of the latter, the traffic would be distributed over the entire road.

A pavement laid according to this plan would also be free from the disagreeable and unsightly drop at the edge that is so often seen on the sides of a bituminous pavement, particularly if the soil of which the shoulders is formed is of a light or sandy nature. This sharp drop at the edge of the pavement is also very injurious to it, owing to the shearing off of the edges of the pavement by the wheels of the vehicles when they are driven off or on. This shearing or breaking of the edge is most destructive to the life of the pavement. The opening so formed admits the water into the body of the pavement and as a consequence disintegration begins. The durability of the pavement is thus greatly lessened, as the breaking of the bond not only causes the shattering of the pavement but permits a movement of the stone particles composing it. This attrition greatly increases the wear, thereby augmenting the cost of maintenance, with the result that the annual expenditure is much increased.

The ultimate cost of a combination type of pavement constructed as above described will be much less than that of the other kind, so that whether measured on the basis of first or maintenance cost the pavement above described will be by far the cheapest.—Good Roads.

Waterproofing blue prints is accomplished by the following process, according to the Mining and Scientific Press. Immerse in melted paraffine until saturated a number of pieces of an absorbent cloth 1 ft. or more square. When withdrawn and cooled they are ready for use at any time. To apply to a blue print, spread one of the saturated cloths on a smooth surface, place the dry print on it with a second waxed cloth on top, and iron with a moderately hot flatiron. The paper immediately absorbs the paraffine until saturated and becomes translucent and completely waterproofed.

Limitations of Distributing Machines

As to Quantity and Kind of Material Applied—Various Types of Distributors Considerations which Govern the Selection of Type*

By Henry B. Browne, C.E.†

WITHIN the past few years several different types of distributing machines have been designed in this country for the purpose of applying bituminous materials in the construction and maintenance of highways. The aim of some manufacturers has been to construct a distributor which will be able to do any class of work with any kind of bituminous material. Up to the present time, however, every distributor made is limited as to quantity and kind of material which it will distribute. There are many instances in which a distributor has applied materials of a certain grade with excellent results, and in some cases those interested in the machine, because of their unfamiliarity with the different kinds of bituminous materials, have unfortunately jumped to the conclusion that any other kind of bituminous material could be distributed just as successfully. That the contrary has proved to be the fact is common experience, and a study of conditions will show that there are good reasons in explanation of it.

In the first place, consider the different kinds of bituminous materials used in modern highway improvement together with the amounts desirable per square yard in some of the different methods of construction and maintenance. First, there are the asphaltic oils and tars which can be applied cold in amounts varying from 0.10 to O.25 gal. per sq. yd. Such materials are used mainly as dust palliatives and several treatments may be necessary during a season. Asphaltic oils and tars used in the construction of bituminous surfaces are generally of a greater consistency and require heat to render them sufficiently fluid for application. They may be semifluid or semisolid when at ordinary temperatures. This kind of work requires applications of from 0.25 to 1.00 gal. per sq. yd. Work done by the penetration method usually requires the use of a still stiffer material, to be applied in amounts varying from 1.25 to 2.00 gals. per sq. yd. Flush coats on bituminous pavements are sometimes specified to be constructed of asphalt that is solid at ordinary temperatures, using from 0.50 to 1.00 gal. per sq. yd. From the foregoing it is obvious that it is a very difficult matter to design a distributor capable of applying such a variety of materials in these varying amounts.

Types of Distributors

Consider next the different types of distributors. There are two distinct classes, namely, gravity and pressure distributors. A gravity flow distributor is really nothing more than a larger viscosimeter. A pressure distributor differs from the viscosimeter principle in that it has the added feature of pressure which forces the material through the opening. In the bituminous material laboratory a viscosimeter is an instrument for measuring the consistency of a material when fluid. Essentially it consists of a receptacle holding a definite quantity, in which the material can be placed and heated to any desired temperature. The bottom of the receptable is provided with an orifice for emptying. The measure of the test depends upon the time consumed for a certain quantity of material to run through this outlet. A distributor consists of the tank and the valved distributing pipes which are provided with slots or holes through which the material must pass. In the laboratory the principal variation made in the tests of different materials is that of temperature. In a distributing machine, however, the temperature of the material and the size of opening, and the pressure, if a pressure machine, have to be taken into account. In order to distribute a definite amount of material per square yard the speed at which the machine travels also has to be reckoned with.

In the gravity machines the material ultimately flows through a slot which extends the full length of the distributing device, through holes bored in pipes or through nipples fitted into the pipes at small distances apart. The slot is adjustable so that larger quantities of material can be applied by opening the slot wider. Using certain grades of material and quantities above 0.5 gal. per sq. yd., the slotted distributing pipe will apply the material in an unbroken sheet, if proper care is taken to prevent the parts from becoming clogged. In the case of the distribution of material by means of pipes provided with holes, since the size of holes cannot be changed, larger quantities of material are applied either by bringing into use more pipes or by changing the temperature of the material. Such machines are generally provided with two or three such pipes. The flow of the material, however, will consist of a series of small streams which do not unite on the road surface unless a large quantity of material is being used or unless the distributor is equipped with brushes, a feature characteristic of some of the foreign types. If the separate streams impinge on a splash board it will serve to unite them to a large degree when quantities of over 0.5 gal. per sq. yd. are being applied. The character of the flow from pipes fitted with nipples at small intervals apart is about the same as in pipes with bored holes. By inserting different sized nipples in the pipe, however, the machine can be better adapted to applying different grades and quantities of material, than can the machine provided with pipes without the nipples.

Pressure distributors can be divided into two distinct classes: those in which the distributing device is fixed to the tank wagon and those in which it is separate from the tank wagon. Those machines which consist of a pressure tank and flexible hose will not be considered in this paper. Pressure may be derived in a variety of ways; by rotary pumps, by duplex pumps, by air or by steam. Power for the pumps is obtained by steam from a steam roller, by a gasoline engine or by a chain drive from a sprocket attached to the rear wheel of the tank wagon. The distributing device consists of a horizontal pipe to which are fixed special forms of nozzles spaced 6 ins. and more apart. Some machines have two horizontal pipes with the nozzles of the two pipes staggered. The nozzles are bored so as to give a fan or a cone-shaped spray. In some of the machines the gasoline engine and rotary pump are fixed to the back of the tank wagon, together with the distributing pipes. Again, all the distributing apparatus may be mounted on a separate truck which trails after the tank wagon. When a steam engine is used to run the pump, the engine, pump and distributing pipes are generally mounted on a separate truck. In the case of sprocket drive machines the pump and distributing pipes are fixed to the tank wagon. When the pressure is obtained by the contact of the steam or air with the material in the tank a specially designed tank wagon must be used capable of containing steam or air under pressure, the distributing pipes being attached to the tank. Up to the present time all of these machines, with the exception of one or two types, have been built for the application of bituminous materials which range from a fluid to a semifluid state of consistency at ordinary temperatures. There is one instance of which the writer is aware in which one of the machines applied successfully a semisolid material. This would not have been possible except that live steam was turned through the distributing pipes, thoroughly warming them before the application of the material.

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*Paper presented before the American Association for the Advancement of Science.

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A very essential part of any distributing machine is the tank. Some of the distributing devices are meant for attachment to any type of tank wagon while others are fitted with especially designed tanks. It has been the practice in this country to use tanks with a capacity of about 600 gals. This is contrary to the practice in Europe, where the largest tanks are about half this size. The tanks in this country the generally cylindrical; in Europe they are rectangular and shallow. The principle advantage of large tanks is that more material can be handled at one time and in the case of long hauls fewer tanks will be needed. Where a distributing machine is used which either trails after the tank or is detachable the changes from one tank to another will not be so frequent, hence not so much time will be lost for this reason as when a smaller sized tank is used. The disadvantages are that unless the wheels are provided with tires at least 6 ins. wide they will rut the surface in certain kinds of work and the temperature of the material is harder to control, frequently involving lost time in raising the material to the required degree of heat. A great many of the tank wagons in use are the old type of watering carts made over. As these are usually not fitted with means of heating the material, the work of the machines is limited to applying those materials which either require very little heat or no heat at all. The time will come, when, in the writer's opinion, practically all of the materials used will be of such a consistency that they must be heated and kept hot. Obviously, then, some means of heating the tank must be provided. This is done now by placing steam coils inside the tank, by a coal or wood fire, or by an oil burner under the tank. The direct fire is probably the better if it can be controlled, since it is more rapid and avoids the use of a boiler. Although the tank may be furnished with a heating apparatus it will generally be found more economical to first heat the material to the desired temperature in kettles or tank cars, depending on how it is shipped, and then to transfer it to the distributor tank, where it may be kept hot by the heating apparatus of the tank. There are several pumps now on the market which handle the different materials readily so that the operation of transfer does not involve much time. On some of the distributors, where a gasoline engine is attached to the tank, the engine may operate the pump so as to fill the tank.

Points of Interest in Different Types

Those distributors which consist of a steam engine, pump and distributing pipes mounted on a truck trailing after the tank wagon require the use of a steam roller or tractor to furnish steam for the pump engine. The roller, tank wagon and distributor truck together, extend along the road for a distance of about 30 ft. If the truck were not provided with a steering apparatus independent of the tank and roller considerable difficulty would be experienced in keeping the distributor in its proper place. A disadvantage of this type is that it necessitates the use of a roller when in operation, which is an expensive item. This machine is also clumsy for operation on city streets, where short stretches, one or two blocks in length, have to be treated, thus requiring the frequent reversing of the machine.

Distributors in which the pressure is obtained by contact of air or steam over the material in the tank, the distributing pipes being fixed to the tank wagon, also require the use of a roller or tractor. The tank, in order to withstand the pressure, is built of heavier material and hence is more expensive than one not so designed, besides being harder on the horses which haul it from the point of supply to where the material is being applied. The expense is increased by the use of the roller, as in the case of the type mentioned above. When certain grades of asphaltic materials are applied by this distributor it is necessary to equip the roller with an air compressor for furnishing the pressure, since live steam in contact with certain grades of asphaltic materials will cause the latter to foam. This type of distributor and the preceding are the only pressure machines at present capable of handling the heavier binders, since they are provided with steam for cleaning and heating the distributing pipes when so desired. There is a possibility of stalling the roller or tractor with this type of machine when distributing heavy materials on account of the inability to furnish the requisite amount of steam to both heat the material and furnish the pressure.

Distributors in which the pressure is obtained by a gasoline engine and a pump, either fixed to the tank wagon or mounted on a truck trailing behind the wagon, may be drawn by horses. They are compact and suitable for work on city streets.

Distributors in which the pressure is obtained by means of a pump operated by a sprocket drive are compact and do the work with equally as good results as those machines in which the gasoline engine is used. They require no skilled labor to operate and may be drawn by horses, this being the cheapest form, under certain conditions, as far as operating expense is concerned. These machines are limited, however, in the amount of pressure obtained since the sprocket drive acts as a brake on the wheel. Two horses have drawn a 600-gal. tank wagon with 500 gals. of material up a grade of about 4 per cent. and maintained a pressure of 15 lbs. On level ground it requires three horses to pull the machine without unduly tiring the horses when a pressure of 30 lbs. is used. The two types just mentioned have been used for distributing only the lighter grades of bituminous materials.

At this point it may be well to consider why some machines operate under 15 lbs. pressure while others use a pressure varying from 40 to 90 lbs. The resistance to flow depends upon the consistency of the material and the size of the holes through which it must pass. Sufficient pressure must be obtained to overcome this resistance and also to force out the quantity desired. In distributing the same amounts of material the more viscous the material the more pressure is necessary. The writer believes that the correct amount of pressure to use is that which will insure a uniform distribution of the material in the requisite quantity, and that anything over this amount is wasted energy. Unless a machine is provided with interchangeable nozzles of different sizes the pressure must be varied in order to obtain the desired distribution of different grades of material. The relation between the size of the nozzle, the pressure and the amount of material distributed can be obtained only by exhaustive experiments for different grades of material.

As was mentioned in a previous part of this paper the speed at which the distributor travels has to be taken account of in getting on the desired quantity of material. No matter how nicely the other parts of the machine may be related, a variation in the speed will upset all calculations as to quantity applied. With mechanical tractive force this point can well be taken care of after sufficient experiments. With animal tractive force, although it is a little more difficult, it is not impossible to obtain uniform speed.

The extent and nature of the work to be done will determine the kind of a distributor to use. For repair work on isolated stretches a small capacity machine similar to some of the European types could be used to advantage. For flush coats on bituminous pavements, which are to be applied simultaneously with the construction of the pavement, a hand drawn gravity distributor will be found economical, since only short stretches will be covered at one time. For extensive superficial treatments or for penetration work a distributor of the large type can be used, the particular kind chosen for the work depending upon the character of material to be used, the location of the work and the quantity to be applied.

Concrete in Bridge Building

By Frank R. McKibbon

NEVER before in the history of bridge engineering has the influence of public opinion been so noticeable as at the present time; and the interest shown by the public in this important branch of construction is very gratifying, especially to those engineers who have labored unceasingly to have bridges regarded from the artistic as well as from the utilitarian standpoint. Public opinion is now demanding not only that bridges shall be made better, but that they shall be more suited to and expressive of their purposes and environments.

Although great advances have been made in the status of bridge engineering, there is still room for improvement; for it is often impossible to make communities realize that a bridge is something more than merely a means of crossing an opening. They are not willing to make the additional appropriations necessary to secure artistic bridges, even though the structures may occupy such conspicuous positions as to require more impressive and finer treatment than some public buildings upon which vast sums are expended to secure pleasing architectural effect.

A beautiful arch bridge is a wonderful structure. There is something inspiring about it. And engineers must do all in their power to have the public realize this, and appreciate the beauties that can be created by proper and simple combinations of common materials of construction. Symmetry, grace, simplicity, and truthfulness are essential elements in a bridge possessing architectural merit. Truth is a basic element; and when one material is disguised to represent another, or when a part is made to appear as if performing a certain function when in reality it is performing quite a different one, the result is a dismal failure.

Remarkable Progress in Recent Years

The most remarkable development in bridge construction during the past quarter of a century has been the progress made in the use of concrete, either alone or reinforced with steel. When it is considered that only 22 years ago the first reinforced concrete arch bridge was built in Golden Gate Park, at San Francisco, and that from this small span of only 35 feet to the recently constructed arch span of 321 feet in New Zealand is a tremendous step, it is evident that progress has been truly wonderful.

Concrete, like stone, is best suited to resist compressive stresses; and it can be readily moulded into any desired form or size; and it is therefore not surprising that when concrete came into use as a bridge material it should have been used in the arch form. It was a comparatively easy change from the stone arch that had been the standard arch form for many centuries, to the concrete monolithic or voussoir arch of similar outline.

But it was soon realized that concrete in combination with steel has a distinct individuality of its own; and hence important changes were made in the form of construction, resulting in the use of lighter structures of more pleasing design and appearance. The constant tendency has been towards the elimination of redundant material. The use of arch ribs, with the variation in size and shape thereof to conform to different classes of loads, or the use of solid arch rings upon which rest column or cross walls to support the roadway above, approaches the design so commonly adopted for arches with steel, and in this respect represents a decided departure from, and improvement upon, the solid arch ring with its superimposed earth fill, which was until recently the standard form of masonry arch construction.

The most recent type of reinforced concrete highway bridge construction consists of a flat deck on which the roadway is placed, the deck in turn being supported by columns or cross-walls resting on a solid arch ring or upon ribs. These ribs are usually rectangular in cross-section, although those of circular form would give a more pleasing appearance, but would be more costly and more difficult to build. Unless the ribs are very wide, they should be braced to prevent lateral displacement under stress. Much can be said in favor of this open spandrel construction, except for very short spans or for spans of small rise, where the old method of placing the roadway on earth filling retained between longitudinal side walls is better. In the absence of such limitations, however, the open spandrel construction results in a great saving of weight of superstructure, with consequent diminution in size of foundations, and often also in a more pleasing design. For railroad bridges the column-and-rib type has not been adopted, but open spandrels with cross-walls on solid rings are of frequent occurrence.

Hints to Candidates for Public Service

Minor Details that Count: —Familiarity with Requirements, General Style of Application, Candour, Confidence, Personal Appearance

ONLY a very few of those of us who enter the municipal or local government service can hope to progress very far in our career without undergoing the ordeal of becoming a candidate in open competition for a higher position.

Again, only those who have entered the arena time after time without success can appreciate fully the dreadful sense of discouragement that comes over one on receiving quite a number of polite little circulars informing us that Mr. So-and-So of somewhere else has been successful.

Of course, in the public service, of whatever branch, the stress of competition, as in every other walk of life, grows keener day by day, and disappointments must be expected, if only from a study of the numbers one sees from time to time as having applied for this or that post.

Still, one often wonders just why the successful candidate should have been selected in preference to oneself. He does not come from as good an office as our own, he is younger, and does not appear to have nearly as good qualifications. "Luck," perhaps; well, very often it is just that and nothing more, or at any rate that intangible factor has entered very largely into the result. And yet if you were behind the scenes you would very often see clearly the why and wherefore. For while it is true, no doubt, that such things as "local influence" and "personal canvassing" are still potent powers in the land, I think it must be conceded that in nine cases out of ten nothing more or less than first of all a smart application ensuring a place on the list, followed by a favorable impression at the personal interview before the committee or council, has brought about the result. It surely behoves us then to put our very best effort into our application, recognizing that nothing but this has the slightest chance among so many aspirants, and always remembering that from this short document alone those who have the selection have to form an estimate not only of our qualifications, but, from internal evidence contained therein, our personal character.

It has been my duty to open, analyze and tabulate the applications received on several occasions, and quite recently to prepare a select list for a junior appointment in my own office. On completing my task I stood contemplating the heaped-up pile of human effort, wondering if I really had selected the best six, or whether lying buried amidst the number of unsuccessful applications was some undiscovered gem of sterling worth.

This would, with every care on my part, have been quite possible, from the fact that so many of the applications bore evidence of want of training and method in preparation, and thus it may be that a candidate having really good points had quite failed to bring them to my notice. Let it be recognized, more especially by younger members of the service, that an application, to stand out from its fellows, must be prepared with that object, and be such as immediately to command attention.

Everything counts, right from the very envelope in which the application is sent to the testimonials it encloses. Handwriting, good paper, legibility, the marshalling of facts in clear chronological order of training and experience, general style and appearance —all lend their weight.

Study Requirements Carefully

The first point, perhaps, that I can recommend is a very careful study of the advertisement, and having made this, consideration if you are in every way eligible. It is of no use blinking facts to oneself. Competition is so severe that unless you are competent from training and experience, or, for example, are not within the limits of age, it is useless to waste your own and other people's time by applying. Do not think from this that I wish to damp anybody's laudable desire to get on, and, of course, "luck" might come your way. Really, though, there are already so many people who cumber up the candidates' list and who by no possible chance can hope to succeed, that they cause themselves a deal of unnecessary trouble, expense and disappointment. Do not imagine I mean that, supposing a borough surveyor has a vacancy for a qualified "General Assistant," you are eligible because you have just completed your articles with an architect in private practice, or that for a public library requiring a librarian you are just the man because you are in a town clerk's office. You have not had the speciliazed training required, and fifty of the others who apply will have. Take any hint, also, contained in the public announcement of the vacancy, such as "preference given to candidates holding the certificate of the Surveyors' Institution." If you have not this diploma, its equivalent or something better, do not apply. Modern practice all tends towards specialization in greater or less degree. No, choose your department, and get every qualification you can that it requires, then sail ahead when opportunity offers and "Try, try again." Quite 30 per cent. of the applications I referred to a little while since were received from persons having no possible qualifications for the post, and this is no solitary example.

Having decided, then, to become a candidate, let us return once more to the advertisement. Follow its directions implicitly down to the smallest detail. If it asks for everything to be in the candidate's handwriting, do not, for instance, type or print your copies of the testimonials. If it asks for two testimonials, do not send in three, or any like foolishness.

Details that Count

It would be impossible here to do more than indicate generally the lines your application should follow, as the circumstance will vary in some degree with the class of appointment offered. You will, however, have already gathered the care and attention I advise you to pay to many things. As I have already said, you must remember that it will not only be from the subject-matter of your application that you will be judged, but an opinion will be formed of your general character from the internal evidence it contains. For instance, a man who makes careless mistakes there, will be likely to make them elsewhere. If you [illegible]

By "A Borough Surveyor," in The [illegible] Surveyor.

to deceive by palpable exaggeration there you are not likely to be reliable in your everyday dealings in your new post. If you do not produce a neat and business-like document now, with so much depending upon it for your own advancement, are you likely to exert yourself to turn out good work in your employer's interests? Make the very best of your own goods—that's what you must do to succeed. But, on the other hand, do not state anything that will not bear investigation should it come to the test.

Among other small matters, address your application direct to the persons having the power of appointment, as, for example: "To the Mayor, Aldermen and Councillors of the Kirkhampton Town Council," or "To the Chairman and Members of the Wallsend Urban District Council." "Gentlemen." Then go right to the point. Do not say, as nine out of every ten candidates will: "Having noticed your advertisement in this week's Local Government Gazette for a general assistant in your surveyor's office, I beg, etc." Never mind how you got to know there was a vacancy. Say: "I beg to offer myself as a candidate for the position now vacant of general assistant to your borough surveyor." Then give your true age on your last birthday. Do not quibble in order to make yourself appear a little older by saying "I am in my twenty-sixth year." If it is the end of February now, of course you can, if you wish, say "I was twenty-six years of age on March 14th last."

Then particularize your present appointment and qualifications, and go on to show (guided, of course, by the nature of the appointment) how your education, your having served your articles of apprenticeship, your subsequent appointments, the examinations you have passed, and your experience generally fit you in every way for the position offered; and, if a junior, impress them with the fact that you will prove a real assistant to your new chief if appointed.

Get Well Posted

Of course I can do no more than indicate that there are ways, by using your brains a little, of helping you considerably so to frame your application as to meet exactly the requirements of the situation. For example, let us suppose that a bald advertisement appears stating that the council of some seaside resort requires a new borough surveyor. You have never been there, and do not know the town a bit. Well, make it your job to find out everything there is to know of the class of place it is, and what special matters (like waterworks, public baths, or other projects, just a little outside the usual run, perhaps) will be under control. Or, again, make a special point of enquiring what new large works, if any, are contemplated in the near future, such as an extension of the sewage system, or a new sea-defence wall and parade. Having gleaned what you require, it is easy to emphasize in your application that part of your experience bearing on the points in question. Obviously, for instance, on the other hand, it is no use to indite long paragraphs setting forth your special knowledge of sewage farms if the sewage is discharged direct into the sea. Need I say more? The advertisement will often give you general information, but frequently it is easy to gather a little particular knowledge of the greatest service. Before leaving this part of our subject, just a word more to the juniors—and that is, "Do not exaggerate." I have before me an application for a junior appointment from a boy in a borough engineer's office—a veritable prodigy if all he states be true, for he claims to have a thorough knowledge of surveying and levelling in all its branches, is an experienced draughtsman, with special knowledge of architectural work, and sewage and drainage, road making, private street works, waterworks and tramways, and yet makes at least two mistakes in spelling. Believe me, the man who is going to look through your application will not expect all these things of you before you are twenty-one. He is more likely to be content with a genuine statement that during your articles your chief has been carrying out works of the comprehensive nature set forth above; that you have got some satisfactory knowledge of office routine, can make an accurate survey, produce a neat drawing, have passed a preliminary examination, or can produce a certificate or two from the Science and Art Department of the Board of Education in building construction or the like. I declare it to be an absolute fact that out of six selected candidates for a junior appointment who appeared before a committee here, and all of whom had stated in their application that they were competent surveyors, only one could read an angli set up on a theodolite standing in the council chamber, and four of the six were not able to make any attempt at all. Be warned, therefore, and do not hope to deceive by claiming to be able to run while still "in arms," for you would only be miserably unhappy if by any chance you managed to secure the post and were found wanting.

Concerning Testimonials

And now as to testimonials. I am afraid at this date, while they are still the fashion, their value has been considerably discounted owing to experience common to us all. Let them at any rate have some bearing and be a little varied. By that I mean get them from people competent to form a judgment. To produce one from your schoolmaster when you are twenty-five has only a limited value. He cannot judge but generally of your professional ability. Suppose, for instance, three are required; get two that speak of your qualifications, and let one go to show something of your personal character.

Your application is now ready for dispatch, printed it may be, and neatly bound up in narrow green ribbon for an important post, typed or neatly written for others, but always with an outside title page setting forth tersely its contents. Send it off then in good time; do not wait until the very last day of post. There are such things as accidents; and do not forget to put the endorsement on the outside of the envelope.

On the much-debated question of canvassing I shall say but little. In many instances this is now strictly forbidden, but in others "personal" canvassing only is tabooed, and it is still permissible to send a copy of your application and testimonials to the members of the local authority or committee. The names you can easily obtain, as a rule, on application, or from the local newspaper people. Do not forget that you must spare no legitimate effort to make your name stand out from the ruck in some way or other—even if it is only by using blue foolscap instead of white. As to any personal influence you may be able to bring to bear, I can only leave that to your own good sense and taste; but always remember that frequently more harm than good is done by the people who pester on behalf of candidates of whom they have no real personal knowledge whatever.

The Interview

Now only remains the fateful interview. Our application has done the work required of it, and we have been requested to present ourselves as one of a selected number for inspection. Here, of course, a man's personality counts for a very great deal, and it is everything to create a good impression. I am afraid it is of little use to tell the nervous man, who positively dreads it, not to be afraid, but one can warn the very cockshure of going to the other extreme.

All things count, dress and general appearance, of course. Do not overdress, but, at any rate, go looking, as it were, worth your money. Perhaps, however, the one great tip is contained in the words "Speak up." There are sometimes quite a number on the committee or council, and there are certain to be some who cannot hear well; but anyhow it gives a general impression of confidence.

You must be on the alert for opportunities to bring out your strong points. Do not worry by anticipating that they are going to ask you too much or questions you may not be able to answer. They will not; for, as a matter of fact, unless the interview has been arranged beforehand by the chairman or head permanent official, you will be surprised at the somewhat inane things that will be asked of you, or find that you are being merely required to confirm a few points in your application. You will not often get a chance to say much to the point unless you are quick to make the opportunity for yourself as you go along.

Reading over the foregoing I very much doubt if I am competent to give you all the advice I should like to give. Certainly I myself have made very nearly all the errors I am asking you to avoid, but if I have succeeded in helping any of those who are coming after me to put up a little better show on the next occasion they enter the list my efforts will not have been entirely in vain.

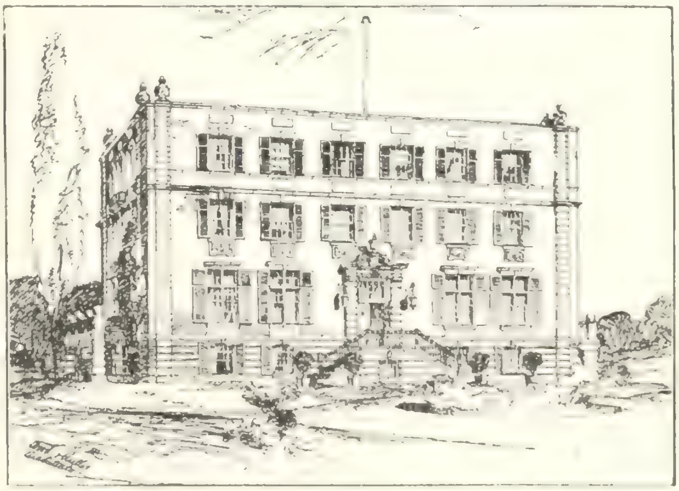
New Departmental Store for Montreal

The proposed Birchenough Building, on St. Catherine street, Montreal, will be erected on a site, 390 x 97 ft., at the south-west corner of Bleury street and south-east corner of Alexander street. The site was purchased by Mr. J. W. Birchenough for $1,500,000, and the estimated cost of the building is $[illegible] The architects are Messrs. Finley & Spence, Montreal.

Replacing a washed-out embankment so that it has required no further maintenance for a number of years, was accomplished by Mr. A. E. Killam on some Government railroad work in New Brunswick with a revetment of brush, stone and timber. About 1,000 ft. had been washed out at a point where the soil was alluvial, underlaid by gravel. The bottom was first leveled off and a foundation of evergreen brush about 20 ft. wide laid with the pieces at an angle of about 45 deg., the tops pointing down stream. On top of this a form of timber abutment 14 ft. high was built, 7 ft. from the front. The space back of this wall was filled with earth and stone, the embankment being made its original width. The top surface was then covered with a layer of heavy stone. In an account of this work, Mr. Killam states that he has found that in such cases, soft wood brush, such as spruce and fir, placed and covered with stone in the manner described, is the best material obtainable.

School for the Blind

Messrs. Hutchison, Wood, and Miller, Montreal, have designed a school for the Montreal Association for the Blind, which is to be constructed on a site on Sherbrooke street, Notre Dame de Grace, a suburb of the city. Mr. C. E. Deakin is the contractor. The building will be 106 x 47, and consists of three storeys and a basement. It will be fireproof, the exterior being of Laprairie brick with stone dressings. The school is for the English speaking blind, and has been planned with a view to the training of a large number of boys and girls. They will be taught pianoforte tuning and various trades in order that they may earn a living. The foundation of the building is to be of concrete, and the external walls are to be lined with terra cotta. The floors will be hardwood on concrete, the stairs of iron and the roof of cement, and the front steps of Montreal limestone. The interior is to be finished in pine. A system of steam heating is to be provided, while the lighting will be by means of electricity.



Proposed School for the Blind, Notre Dame de Grace

In the basement, technical rooms for girls and boys, tuning rooms, dining rooms, and kitchen will be situated, and on the main floor there is to be a large assembly room with two class rooms, the latter being fitted with sliding doors which, when opened, will form the rooms into a part of the assembly hall. On the same floor there will be the matron's room, girls' sitting room, library and board room; on the other side of the floor there will be the office, master's sitting room, and boys' sitting room. The remaining portion of the building will be devoted to dormitories and bedrooms, lavatories, &c. A play ground of 8⅛ acres is part of the scheme. The cost is estimated at $80,000.

Calgary Settling Down to Steady Growth

Spasmodic Activity giving place to Continuous and Consistent Development — Important Features of a Busy Season

Correspondence of the Contract Record

Calgary, Alta., May 23, 1912.

BUILDING operations in Calgary have been somewhat quiet during the past two weeks, very few new contracts having been let since the end of April. On the other hand, a great many new buildings are announced for tenders very soon, and the next two months should see many important operations under way. Real estate, too, has been very quiet, and everything seems to have settled to steady growth, instead of maintaining the wild scramble so very prevalent at times.

One indication of the development along normal lines has been the incorporation or the formation of three large companies for the exploitation and working of the three natural resources which some day will make Calgary famous, namely, natural gas, clay products and sandstone. The Alberta Contracting & Supply Company, Limited, has been formed, and will go into a general building supply, gas fitting and gas appliances business. The new company has been formed as a result of the invasion of the natural gas companies into Calgary, and those interested see great possibilities for such a concern. Mr. S. A. Clancy, formerly manager of the firm of Gorman, Clancy & Grindley, has been instrumental in forming the new company, and he will be its managing director. Associated with him will be Mr. W. T. Cushing, of Chicago, an expert in gas fittings and appliances. Col. James Walker, of Calgary, will be the president of the new company, and the board of directors will be made up of other well-known local capitalists.

A Great Clay Industry for Calgary

As announced briefly in a recent issue of the Contract Record, Mr. W. J. Tregillus will be the head of a clay products company which will build a plant in Calgary for the manufacture of all manner of bricks and terra cotta. The concern will be known as the Tregillus Clay Products Company, a close corporation with a capital investment in lands, buildings and machinery of $500,000. One hundred thousand dollars has already been contracted for the purchase of machinery sufficient to keep two hundred men employed. This contract has been let to the Bonnot Company, of Ohio, and calls for 500 tons of machinery to be placed not later than July 1, 1912. The plant will be located on the Bow River, four miles west of the Calgary post office, and the site is such that the raw materials will be brought to the plant entirely by gravity. The equipment of the plant will be sufficient to produce an output of brick and clay products as great as that of any other concern in the Dominion. Twenty kilns of the rectangular down draft type, each with a capacity of 200,000 brick, will be installed ultimately. It is intended to make this one of the most up-to-date plants in America, and to that end Mr. W. G. Worester, of Columbus, Ohio, has been employed to develop and manage the new business. With him will be associated Mr. A. S. Chapman and Mr. A. L. Tregillus, both of whom are considered to be expert ceramic engineers. Natural gas, the finest of shales, a modern plant, good water supply and an ideal site, will contribute to make this a most prosperous undertaking.

Hudson's Bay Store, Calgary—Foundation work in progress

The Western Canada Stone Company has been organized to take over the stock and contracts of the Quinlan-Carter, Limited, together with the stone dressing plants at Calgary and Edmonton. The capitalization of the concern will be $750,000, and Ald. John G. Watson will be the managing director. Working in connection with the Quinlan-Carter quarries, the new company, with its complete plant, will soon be in a position to supply the local markets with the highest grades of sandstones, in competition with the Indiana quarries.

Hudson's Bay Store, Calgary—Looking toward finished basement floors. Note column bases depressed

The Alberta Ornamental Iron Works, with a plant at Redcliffe, Alberta, have opened an office in Calgary. This plant has been in operation some three months, having moved into Alberta from Minneapolis, and represents an investment of $200,000. An unlimited supply of natural gas was a deciding factor in the location. Raw material comes from the smelters at Fort William. The firm have secured the contract for supplying ornamental iron for the Lougheed Building, now under construction.

Calgary has one of the few deposits of silica suitable to the manufacture of window and plate glass, and at present at least two firms are proposing to establish plants in Calgary. Mr. Miller, Calgary's hustling Industrial Commissioner, is negotiating to secure the establishment here of a tannery and shoepack factory, being a combination of two plants whose properties have been partially destroyed by recent floods in Ontario.

Progress on the Hudson's Bay Buildings

The views showing progress on the new Hudson's Bay Company's "20 Departments" Store serve to give some idea of the magnitude of the building. This will be one of the most complete stores in Canada when finished and will represent an investment of over $1,500,000. The building will measure 130 ft. by 250 ft., will be six storeys high at first, with provision for two additional storeys. The construction will be steel cage, reinforced concrete and terra cotta Ninety-six H-section columns will be arranged in bays 18 ft. 1½ in. by 22 ft., all seated on cast iron bases depressed below the basement floor. Considerable ground water was met with, and so the entire basement floor will be one sheet of concrete. waterproofed with Ceresit. The photographs give a very good idea of the arrangements. Messrs. Burke, Horwood & White, of Toronto, are the architects, and the construction is being carried out by Messrs. Carter-Halls-Aldinger, of Winnipeg.

Many New Business Blocks

Besides these industrial plants, quite a large number of new business blocks are projected, to be constructed the coming summer. The Massey-Harris Company have acquired property and will build a warehouse 200 ft. by 140 ft. at an estimated cost of nearly $100,000, to accommodate their Calgary business, as the C. P. R. have ordered them to vacate their present situation. The Canada Life Association have announced definite plans for the construction of a six-storey office building, to cost over $200,000. This will be the ordinary steel cage construction, with terra cotta facing. The architects are Messrs. Brown & Vallance, of Montreal. The old Royal Hotel, on Eighth avenue, has been condemned by the license commissioners and it is highly probable that a new office building will be erected on the site, which is the property of the Imperial Bank of Canada. The proprietors of the King George Hotel have secured the adjoining 25-foot lot and have announced their intention of erecting an extension to their recently finished building. The John Irwin Company, Limited, are starting work on a new warehouse to cost some $40,000; the McPherson Fruit Company, of Winnipeg, are arranging with J. McDiarmid & Company, also of Winnipeg, for the construction of a warehouse to cost over $100,000. Dr. Blow, one of Calgary's best known citizens, has already started work on a three-storey business block, which will later be run up to six storeys. Four more small apartment houses are in course of construction and tenders are to be called for shortly for two others. Within the next month it is not unlikely that at least two more important structures for erection on Eighth avenue will be announced, but as yet the plans are not definite. However, local capitalists are behind the schemes, so that they will materialize shortly.

Large Municipal Expenditure

The ratepayers of the city of Calgary have approved of by-laws for the expenditure of over $480,000, to be divided as follows: for a surface drainage system, $300,000; for a concrete sub-base under the street railway, $88,000; for improving, protecting and equipping the parks and cemeteries, $95,000. By-laws calling for the expenditure of $130,000, to provide for a small-pox hospital and three combined police and fire stations, together with another to provide several hundred feet of retaining walls, to cost $18,500, will be submitted to the ratepayers for approval on June 3.

Hudson's Bay Store. Footing and excavation. Note trough for carrying away ground water

Considerable agitation on the subject of civic planning has resulted in several schemes for the beautification of the city, but it has remained for private individuals to take the first step towards the improvement of any large area. Messrs. Jennings & Foster have just let the contract for the improvement of Lake View Heights, a contract amounting to $95,000, covering the construction of concrete retaining walls and a boulevard around the lake which lies within their property. This contract has been let to Herschel A. Sayre, of Pittsburg. It is not improbable that some definite step will be taken on the part of the city towards the accomplishment of some one of the suggestions to be made by the City Planning Commission. Tenders are now being called for the construction of eight new schools for the city—two 13-room buildings, and the others smaller.

So many new railroads are being laid out on paper that it is almost impossible to state just what lines will be built. Construction on the Alberta Interurban Railway is languishing now, pending a decision from the city officials regarding right-of-way into the city. The construction is all ready to be commenced from the Calgary end and some decision will be given soon. The C. N. R. are also delaying their construction on mere technical grounds, and one would suspect that they were arranging with the G. T. P. for a Union Station. Although all the line is graded into the heart of the city, no rails have been laid as yet, nor have any bridge abutments been started, so that the delay is for some purpose.

Important Irrigation Contracts

The various contracts for the construction work of the Eastern Section of the Irrigation Projects of the C. P. R. Department of Natural Resources have been awarded, and will aggregate over $1,000,000, extending over a period of two years. From the engineering point of view these are perhaps the most important contracts that have been let here for some time. The most important contract is that for the reinforced concrete aqueduct, amounting to over $500,000. Some description of this flume is to be found in an article by Mr. A. S. Dawson, Chief Engineer of these works, appearing in the Annual Number of the Contract Record for April 24th, 1912. In detail it will be 10,500 feet in length, being in the form of a suspended trough 20 feet wide and 9 feet deep, carried on a series of columns and girders having spans of some 20 feet, making in all over 500 bents. The shell of the flume will be an average of five inches thick, and the entire structure will be of reinforced concrete. It is calculated that the flume will discharge about 900 cubic feet per second and will serve to irrigate over 100,000 acres of land east of Brooks. The construction will involve some 40,000 cubic yards of excavation and embankment, and will contain about 23,000 cubic yards of concrete and 1,750 tons of reinforcing steel. The flume will cross the main line of the C. P. R. about four miles east of Brooks, taking the form of an inverted siphon 10 ft. in diameter. Messrs. Grant, Smith & Company, and Mc [illegible] and will be engaged in the work for at least two summers.

The general contract for the other concrete structures, including [illegible] has been awarded to [illegible] Hughes, of Calgary and Vancouver, for nearly $300,000. This contract will also extend over two years, and will include about 15,000 cubic yards of concrete, with 750 tons of [illegible]. The Canada Foundry Company have been awarded the contract for the supply and erection of the thirty-[illegible] bridges over the [illegible] canal system, involving over 750 tons of structural steel.

Labor Conditions

Labor is none too plentiful in Calgary just now, there being a shortage of lathers and plasterers in particular. The carpenters are asking for an increase to 55c. an hour, but the contractors do not seem inclined to grant it now. One objection to the proposals being made by the carpenters is that no provision is made for a sliding scale of wages, which prevents the contractors from considering any higher rates. An agreement with the Bricklayers and Masons' Union is about to be completed arranging for a uniform pay-day for men of this union, together with a uniform arrangement for arrears in wages due to the weekly payments. Such arrangements do much to remove friction between the employer and the employed, and any better feeling cannot but help all concerned. Calgary has been in the midst of a strike by the thirty odd members of the Lathers' Union for the past two weeks, but things are in a fair way to be settled. The union is asking for time payment, in place of the piece-work payment, and also for a Solicitors' Fee, to be paid by those for whom the union men agree to work. Otherwise the field of labor is as quiet as the real estate business.

Canadian Railroad Development

Announcement has been made that the Niagara, St. Catharines & Toronto Railway Co., E. F. Seixas, General Manager, St. Catharines, Ont., will extend its traction line to Niagara-on-the-Lake this summer.

The Canadian Northern Railway has started surveys from Prince Albert, Sask., for its Hudson Bay line. It has been stated that 50 miles of a line from Prince Albert to Split Lake to connect with the government Hudson Bay line at the latter place would be graded this year.

A special meeting will be held by the Alberta Central Railway at Montreal, Que., on June 4,to consider the leasing of the line to the Canadian Pacific Railway, and to decide upon means to raise funds to defray the cost of constructing and equipping new branches.

The Kettle Valley Railway Company (A. McCulloch, Chief Engineer, Penticton, B.C.), has awarded the contract for grading and bridging to L. M. Rice & Co., Seattle, Wash., for 31 miles of line from Carmi west. The same contractors were also awarded 40 miles of line from Penticton west. The Kettle Valley Railway will lay the track and do the ballasting.

According to a dispatch from Le Pas, construction work on the Hudson Bay Railway is proceeding very favorably. Last week the forces of McMillan Bros., who have the contract for the first section of the road, were augmented by the arrival of one hundred men. Announcement is received of the resignation of Chief Engineer Bruce, of the Dominion Government service on the final location of the second section of this railway.

According to a statement by Mr. A. H. Bruce, the Saguenay Railway from Cap Tourment to Point a Pic, P.Q., will be ready for operation in the middle of November next. Cap Tourment is thirty miles from Quebec, where the St. Anne division of the Quebec Light & Power Railway will connect with the Saguenay Railway, and the length of the latter is fifty-six miles to Point a Pic, the present terminus, with a further extension of 7½ miles, to Nairn's Falls.

An expenditure of $2,500,000 will be made upon improvements in the city of Vancouver by the Canadian Pacific Railway if the negotiations now in progress between the railway company and the city are brought to a successful issue. Among the items proposed is a new station estimated to cost one million dollars, and viaducts, dock facilities, subways and approaches, costing another $1.500.-000. Mr. F. W. Peters, general superintendent of the B. C. Division of the C.P.R., is authority for these details.

Information received from Calgary, Alta., is to the effect that an American Syndicate, including a number of Standard Oil stock-holders, has acquired charters for railroad lines in the western part of Canada, including the Dominion Western, formerly known as the Alberta Pacific Railway. The company is said to be arranging to survey from Calgary to Pincher Creek. This and a line tapping the mineral fields of British Columbia are to be built this year. The line is to be built across the international boundary to connect with some of the transcontinental lines.

A 350-foot draw span with three concrete piers, which is part of a scheme for the entire reconstruction of the Grand Trunk bridge over the Richelieu River at Lacolle, and which was started early in December, has now been completed and put in operation. The remainder of the bridge is still under construction. A creditable feature of this undertaking is the fact that work was carried on without interruption throughout, despite all the difficulties of the severe winter and the more recent spring freshets. The Wellington street bridge over the Lachine Canal at Montreal has also been completed. Work has been started on the G.T.R. bridge over the Saginaw River at Bay City, and the contract for the concrete has been let to Meagher Bros. of that place. The estimated cost of the structure with other improvements is placed at $448,800.

The Fredericton & Grand Lake Coal & Railway Company has awarded the contract for the construction of the line to A. E. Trites & Son. The railway from Gibson to Minto is 31 miles long, and will connect with a line running one mile north of Minto. The contract which Messrs. Trites have calls for the construction of the road and also the construction of the masonry structures of the several bridges on the line. The Dominion Bridge Co., of Montreal, will, it is understood, have the contract for the superstructures of the bridges. The cost of the railway, which is to be a trunk line character in every particular, will be upwards of $650,000, including the bridges. It is expected that the Messrs. Trites will commence work early, as under the contract the entire work is to be completed this season. The work to be undertaken at once will consist almost entirely of construction of camps and other preparations for commencing the main work. It is expected that upwards of 1,000 men will be employed.

Actual construction has been started on the first twelve stalls of what will ultimately be a forty-eight stall roundhouse at Coquitlam, B. C., by Messrs. Sanford, Gordon & Son, who have secured the contract for this work, which is being carried out by the C. P. R. The frontage of this structure, which is the first to be erected by the C. P. R., will be 165 feet, with a depth of 90 feet. The circumference of the rear of the building is 318 feet. Messrs. Gordon & Son also have the contract for the construction of the new boiler house, which will be 48 feet by 49 feet. A spur is being erected from the main line into the site of new buildings for the purpose of bringing in necessary supplies. Mr. E. J. Molley has been awarded the sub-contract for the brick work and a hundred men will be on this work alone. The C. P. R. has now completed twenty buildings, which will be used to quarter the employees, while the construction work is in progress. These are now occupied by about 100 men and five hundred more will move in this week. A sanitary kitchen and dining rooms, separate from the bunkhouse, have been provided by the company.

Canadian Consulting Engineers

Mr. C. R. Young, Toronto

MR. Clarence Richard Young belongs to Toronto's younger generation of civil engineers, but he has made rapid strides during his professional career and is regarded as an authority in structural engineering, of which branch he has made a special study, having been lecturer in that subject at the University of Toronto since 1907.

Mr. Young was born near Picton, Ont., on February 4, 1879, and was educated at the Picton High School and at the University of Toronto. In 1903 he graduated with honors in civil engineering and completed his post-graduate course two years later, obtaining the degree of B.A.Sc. His early experience was obtained on drainage work with Mr. J. H. Moore, O.L.S., of Smith's Falls, Ont., with whom he remained for five months. Afterwards he became identified with the Dominion Bridge Company, of Lachine, Que., and the structural department of the Canada Foundry Company, Toronto, and was engaged for three years upon a variety of practical work, which included detailing, checking, designing and estimating. Later he was employed for a year and a half as assistant to the late James McDougall, then engineer for York County and Chief Engineer of the Toronto and York Radial Railway. Afterwards he was engaged for several months with Messrs. Smith, Kerry & Chace, a connection which he severed to undertake academic work in his alma mater. Later, in 1909, he entered into private practice as a bridge and structural engineer, in which capacity he has been eminently successful, both in his partnership with Mr. Frank Barber and latterly on his own account. Mr. Young is well known as the contributor of many valuable papers to the various professional organizations and technical journals. His discussions on engineering matters are at all times lucid and conclusive and in the journalistic field he is deservedly popular by virtue of much painstaking work undertaken with a desire to help along "the advancement of engineering knowledge." In connection with the University extension movement he has delivered many popular lectures on engineering matters, and he is the author of two booklets: "Aids in Structural Design" and "The Principles of Specification and Agreement Writing." Mr. Young was the organizer of the movement to secure a revised building by-law for the city of Toronto and as secretary of the Citizens' Committee which submitted a masterly criticism of the existing code, rendered a signal service to the constructional interests of Toronto.

Mr. C. R. Young, Toronto

Personal Mention

Mr. H. T. Routley, engineer for the township of Coleman, has been elected President of the Haileybury, Ont., Board of Trade.

Mr. Frank E. Sterns has been appointed assistant Government Engineer on the new Welland Canal. Mr. Sterns was formerly engaged on Panama Canal construction.

Mr. A. W. Gray, formerly county roads superintendent in Frontenac, Ont., has been appointed assistant provincial engineer of highways, and Mr. Arthur Sedgwick second assistant.

Mr. E. H. Keating, consulting engineer, Toronto, has been elected a member of the council of the Institution of Civil Engineers of Great Britain. Mr. Keating is a former City Engineer of Toronto.

Mr. Jno. L. Feeney, the former engineer of Fredericton, N.B., who was succeeded by Mr. Jno. O'Neill, left Fredericton last week for St. John to take up his appointment with the Provincial Department of Public Works.

In the competition for designs for the new University at Calgary, plans have been received from all parts of Canada and the United States. It is expected that the awards will be announced shortly. The preliminary expenditure will be $250,000.

Mr. L. K. Jones, I. S. O., Secretary of Railways and Canals, Canada, has been appointed Assistant Deputy Minister of the department. His connection with the Government Railway System began in 1871 when he was engaged in connection with the Intercolonial Railroad.

At the time of writing, the city of Toronto has received one reply in response to its advertisement for a city engineer. The application is from Mr. Norman A. Hill, now of Toronto, but formerly of Baltimore. It is stated that Mr. Rust's successor will have at least $8,000 a year.

Mr. J. Darlington Whitmore, of Regina, Sask., is leaving for a long trip to Europe and Australia, occasioned by the recent indisposition of his wife. His many friends will join with us in expressing the hope that the tour may be productive of great benefit. It will be remembered that Mr. Whitmore was City Engineer of Moose Jaw, Sask., from 1905 to 1910.

At Victoria last week there occurred the death of Mr. Geo. Alexander Keefer, District Engineer, Department of Public Works for Canada. The late Mr. Keefer was born in [illegible] and entered the government service in [illegible]. He had held the position of District Engineer since 1900. The late Mr. Keefer was a charter member of the Canadian Society of Civil Engineers.

Mr. Angus Smith, of Victoria, who has been succeeded as city engineer by Mr. C. H. Rust, has been appointed City Engineer of North Vancouver at a commencing salary of $350 a month. Mr. Smith went to Victoria from Regina two years ago. He is a graduate of the University of Toronto and a member of the Canadian Society of Civil Engineers. He was formerly in private practice in [illegible]

Ontario and during the past twelve years has been successively head of the works departments in Stratford, Regina and Victoria. During his administration in Victoria the city has expended nearly five million dollars under his supervision.

Professor L. A. Herdt, of Montreal, consulting engineer to the light and power department of the city of Winnipeg, was summoned to the western metropolis a few days ago. It is stated that the advice of Professor Herdt is required on a number of technical problems that have arisen in connection with the operation of the distributing system.

Mr. Rawlins Lowndes has resigned as assistant city engineer of Waterbury, Conn., to engage in private practice as a civil engineer and contractor, with headquarters at Moose Jaw, Sask. He will give special attention to municipal work. Mr. Lowndes has been in the office of the city engineer of Waterbury for 9 years and has been assistant city engineer since 1896.

A new firm of architects has been established in Montreal under the name of Barrott & Blackader, the partners being Mr. Ernest Barrott and Mr. G. H. Blackader. The latter was formerly of the C. P. R. The offices are in the New Birks Building. The British Board of the Bank of British North America have commissioned the firm to prepare plans for a new bank on St. James street, Montreal.

Mr. J. T. Child, City Engineer of Calgary, has submitted to the city planning commission a report containing recommendations as to the harnessing of the Bow River and the diversion of the Elbow River which it is stated would mean a reclamation of 700 acres of land now inundated within the limits of the city. The project would make possible the development of cheap power for manufacturing concerns.

Mr. F. F. Busteed, M. Can. Soc. C. E., until recently General Superintendent of the Canadian Pacific Railway, at Vancouver, B.C., is now Engineer in charge of grade revision and double-tracking from Calgary west, with headquarters at Kamloops, B.C. Mr. Busteed is an engineering graduate of McGill University and served in the engineering department of the Canadian Pacific Railway for 22 years before entering the operating department in 1903. From 1904 to 1907 he was Assistant Chief Engineer of the western lines.

Construction News and Notes

According to the terms of the building by-law now under consideration at Regina, Sask., a limit of ten storeys is placed upon buildings of all kinds,—thus practically eliminating skyscrapers.

A booklet descriptive of Pedlar Automatic-Draft Vents is just to hand from the Pedlar People, Limited, of Oshawa. These vents are made in non-corrosive "Toncan" metal, galvanized steel or copper, and are strongly recommended in that they give the best ventilation and prevent condensation of moisture. They are guaranteed for many years' service.

The Tregillus Clay Products Company, Calgary, concerning whom mention is made in the Calgary letter published in another column, recently placed an order for their entire power equipment, including boilers, engines, pumps and compressors, with Messrs. E. Leonard & Sons, of London, Ont. They have awarded a contract for a complete drying apparatus to the Rodgers Engineering Company, of Chicago.

Three tenders have been received for the building of the City Hall Annex, Montreal. The lowest, by the Peter Lyall & Sons Construction Co., was for $649,000, the building to be finished within 425 calendar days. The second lowest was that of Mr. C. E. Deakin, who asks $678,000 and wants 400 days in which to complete it. Mr. Joseph Bourque was the highest tenderer, his figure being $725,000, and he asks two years in which to complete the work.

Satisfaction is being expressed in Vancouver over Mr. C. F. Pretty's success in London, England, in connection with arrangements to float a $30,000,000 scheme for docks at Lulu Island. The scheme as outlined in these pages recently, involves the construction of docks at the western end of Lulu Island, south of Sea Island and immediately north of the mouth of the Fraser. In addition, it is proposed to construct a tunnel from near Eburne through to False Creek at a cost of approximately $10,000,000.

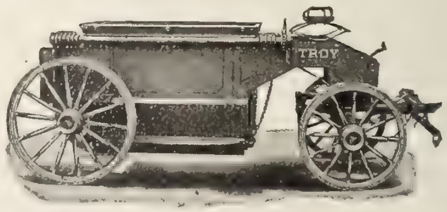
July 22nd and following days have been fixed as dates for the examination for admission to the study of architecture or registration in the Province of Quebec by the Province of Quebec Asssociation of Architects. The examinations will take place in the City Hall, Quebec. Testimonials of study have to be in the rooms of the association, 5 Beaver Hall Square, Montreal, on or before the 22nd of June next. The testimonials are to be accompanied by a fee of $10 for candidates for matriculation and a fee of $25 for registration.

It is reported in Montreal that the Dominion Government propose to erect a new customs examining warehouse which will be the largest in Canada. Plans are being prepared for the erection of the building, which will cover the entire block, bounded by McGill, Youville and Norman streets and the Place d'Youville. The site is about 150 feet in width and 550 feet deep. The property is near the river front and immediately in the rear of the present customs building, and is now in possession of the government. Recently tests were made to determine the nature of the soil.

Messrs. Doyle, Thomas & Christensen, Limited, Calgary, have obtained the contract for a large school at Calgary to cost $175,000. The building was designed by the School Inspector, Mr. H. McLelland, and will be modern in every detail. The construction will be concrete, reinforced after the Kahn system. Bangor slate will be used for the floor and stairways. The building will contain twenty class rooms, two large play rooms, a manual training room and domestic science room. It will be heated and ventilated upon the latest principle, all the air being tempered and washed before entering the school.

Canadian Representatives for Troy Wagons

On account of their increasing business in Canada the Troy Wagon Works Company, of Troy, Ohio, manufacturers of the well known Troy Dump Wagons, have re-arranged their Canadian distributors and are now represented by the following firms: Messrs. Baines & Peckover, Toronto; N. J. Dinnen & Co., Winnipeg; Voncouver Carriage Co., Vancouver; Canadian Equipment & Supply Co., Ltd., Calgary; J. H. Anderson & Co., Montreal.



The Troy Dump Wagon

The Troy Close-Axled Dump Wagon is getting to be a familiar sight on the streets of Canadian towns and cities, which is evidence of its popularity with contractors and municipal works departments.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Berlin, Ont.
Waterworks. Engineers, Bowman & Connor, 56 Toronto street, Toronto. Tenders received by City Clerk for (a) half-million gallon elevated water tower; (b) covered concrete reservoir 100 ft. x 200 ft., including 8,000 cubic yards excavation.

Fort Frances, Ont.
Sewers, cost $14.000. Mayor, D. C. McKenzie; Engineer, D. J. Gillon. Tenders received until 1st of June. Plans at office of Town Clerk, J. W. Walker.

Napanee, Ont.
Sewage Disposal Works, cost $30,000, Tenders received by Town Clerk until noon, June 5th. Plans at office of Engineer, G. C. Wright, Kingston.

Oshawa, Ont.
Concrete sidewalks, cost $3,500. Tenders received by Frank Chappell, C.E., until June 3rd.

Ottawa, Ont.
Septic tanks, cost $6,000. Tenders called. Engineer, Mr. N. J. Ker, City Hall.

St. Genevieve de Batiscan, Que.
Waterworks tenders received by sec. F. U. Germain, until June 1st. Plans at secretary's office.

Sudbury, Ont.
Paving, cost $40,000. Roadmaking machinery required.

Waterworks, cost $15,000. Superintendent, R. W. Martindale. Work started. Cast iron piping used.

Toronto, Ont.
Storm overflow sewers (Sec. 2, Main Garrison Creek). Engineer, City Engineer. Tenders received by G. R. Geary (Mayor), Chairman Board of Control, until June 4th.

Winnipeg, Man.
Waterworks extension. Engr., Mr. H. N. Ruttan, 223 James avenue. Tenders received by Board of Control until June 5th for 10,560 ft. of wooden stave pipe line.

Sewer fittings. Engr., Mr. H. N. Ruttan, 223 James avenue. Tenders received by Board of Control for following, to be delivered as required: 250 manhole frames, 300 grates, 800 brackets, 25 solid covers, 200 mud baskets, 300 catch basin hoods, 250 hinges, 2,500 short steps, 500 long steps, 500 inlet grates, 50 catch basin covers complete, 1,000 stop boxes, 150 valve covers.

Asphalt pavement. Engr., Mr. H. N. Ruttan, 223 James avenue. Tenders received by Board of Control until May 30th, for the paving of McMillan avenue from Harrow to Wilton. Estimated price $2,876.

CONTRACTS AWARDED

Bassano, Alta.
Waterworks and sewerage system. cost $150,000. Engineers, The John Galt Engineering Co., of Winnipeg and Calgary. By-law will be submitted.

Halifax, N.S.
Water pipe, cost $50,000. Dennis Murphy, 57 Spring Garden road, secured contract at $32.50 per ton, also 3,000 valves, to be used in changes of water distribution.

Tillsonburg, Ont.
Sewerage. Engineer, Mr. Bell, St. Thomas. General contractor, H. Sawyer, Tillsonburg.

Railroads, Bridges and Wharves

Arundel, Que.
Bridge, steel and cement, span 50 ft. Specifications at office of Barron & Cushing, 112 St. James street, Montreal. Tenders received by Wm. Thomson, secretary-treasurer, until June 1st.

Cartierville, Que.
Wharf, cost $15,000. Plans at office of E. Patenaude, 1289 St. Denis street, Montreal, who will also receive tenders till June 15.

Glen Valley, B. C.
Bridge (over Dyke Canal). Secretary, Dyking Commissioners, Jno. Cornock, Glen Valley, B.C. Span 35 ft., width 14 ft. Stringers and needle beam 9 in. by 16 in. sawn timbers, cribbing to be 3 in. sound cedar, covering of good sawn fir. Plans ready.

Tp. of Grantham, Ont.
Bridge, over Twelve Mile Creek. Clerk, L. S. Bessey, St. Catharines, Ont. A by-law will be voted on, on June 11th. Full information from Clerk, L. S. Bessey, St. Catharines, Ont. ... ...

Tp. of King, Ont.
Concrete abutments, bridge, over Humber River. Plans at office of Engineer, Frank Barber, 57 Adelaide street east, Toronto. Tenders received until June 5th.

Kingston, Ont.
Bridge, across Kingston harbor, 2,400 ft., middle section to be a swing bridge, centred on a concrete pier. The Department of Public Works will call for tenders about 15th of June. R. C. Desrochers, Secretary, Ottawa.

Moncton, N.B.
Bridge work. [illegible] has prepared plans for steel bridge span 3,300 ft. across Petitcodiac river, one mile below Moncton Station. Plans prepared for a cut off three miles long between north and east branches of I. C. R. The Eastern Amusement Company contemplate erecting a large theatre on Main street, lot 200 x 250 contemplated. Armouries for 19th Field Battery, no site bought yet.

Miramichi Bay, N.B.
Dredging. Tenders called, must include towing of plant to and from work. Specifications at office of MacLean Daily Reports, 220 King street west, Toronto, or at Secretary's office, Ottawa, Ont. R. C. Desrochers, Dept. of Public Works.

CONTRACTS AWARDED

County of Bruce, Ont.
Dennys bridge, repairs, cost $7,800, over Saugeen River. Owner, Township of Bruce. Engineer, Mr. MacDowall, Owen Sound. General Contractor, Hunter Bridge & Boiler Co., Kincardine.

Nicolet River, Que.
Dredging, cost $26,230. 86,000 cu. yds. clay and gravel in Nicolet River. L. Cohen & Son, Montreal.

Winnipeg, Man.
Bridge, repairs, cost $16,021, Salter street over C. P. R. tracks. Engineer, Mr. H. N. Ruttan, 223 James avenue. General contractor, W. J. Holmes.

Public Buildings, Churches, Schools, etc.

Ardath, Sask.
Methodist Church to cost $8,000. Chairman, Robt. Sibbald; architect, D. Webster, Saskatoon. Two storeys, brick construction. Plans in preparation.

Aylmer, Que.
School, cost $6,000. Owner, Aylmer Academy Trustees. Two-room addition, stone construction. Tenders received by N. C. Edey, architect, 71½ Sparks street, Ottawa.

Hamilton, Ont.
Addition to Gospel Tabernacle, Park street. Pastor, Rev. P. W. Philpott. New building to provide for accommodation of 500 more people. New east end tabernacle also considered.

Lachine, Que.
School, cost $25,000, for the Catholic School Commissioners. Work to start this summer.

Montreal, Que.
School addition on St. Germain St., for Hochelaga R. C. School Commissioners. Architect, Dalbe Viau, 76 St. Gabriel street. Tenders called after June 1st.

Vaudeville and moving picture theatre, cost [illegible], for [illegible] of Canada, Limited, 706 St. Catherine St. W. Architect, D. J. Creighton, Jacobs Building. Plans in preparation.

Newmarket, Ont.
Public school. Architect, O. E. [illegible]. Six rooms. Plans at office of

MacLean Daily Reports, 320 King street west, Toronto.

St. Catherines, Ont.
Separate tenders for post office here and at Port Hope. Tenders called. Specifications at the office of R. C. Desrochers, Ottawa, Ont., Sec. Dept. Public Works, and office of MacLean Daily Reports, 320 King street west, Toronto.

Toronto, Ont.
Synagogue, cost $2,500, Centre street, for Share Zedek Congregation. Two storeys and basement, brick. Tenders received by architect, Isadore Feldman, 199 Yonge street.

Viauville, Que.
Church, First ave., for Roman Catholic Parish of St. Clements. Architects, Venne & Labelle, 5 Beaver Hall Sq. 60 ft. high, 52 x 108, stone and concrete. Tenders received until June 1st.

Weyburn, Sask.
Fire Hall. Two storeys, brick; the purchase of a hose wagon with necessary harness and 600 ft. of new hose also considered.

Woodstock, Ont.
Salvation Army Citadel extensions considered. Plans at Divisional Office, 394 Clarence street, London, Ont.

Yorkton, Sask.
School. General contractors, Ritchie & Walters, Portage la Prairie. Tenders received by secretary of school board until noon, May 29th, for ventilating, heating and plumbing. Specifications at office of architect, J. Pender West, 607 Somerset Bldg., Winnipeg, and 9 Dunlop Block, Yorkton.

CONTRACTS AWARDED

Halifax, N.S.
Garbage incinerator, cost $45,000. General contractor, Longard Bros., 213 Hollis street. Clerk of Works, J. J. Hopewell.

Peterboro, Ont.
Police station, cost $5,000, Water St. Architect, W. Blackwell, 40 Benson ave. Carpenter, H. Carveth. Heating, R. J. Sturgeon, 202 Charlotte street. Plumbing, F. R. J. McPherson, 1341 George street. Two storeys, 50 x 30.

Quebec, Que.
Immigration building, laboratory, Architect, Dominion Government Engineering Staff. General contractor, C. E. Deakin, 11 St. Sacrament street, Montreal. Contractor for laboratory building, Mount Royal Construction Co., 287 St. Denis street, Montreal. Steel, Dominion Bridge Co., Ltd., Lachine, Que. Roofing, Sibley & Huot, 77 Duke street, Montreal. Piling, McArthur Piling Co., New York. Two storeys, 80 x 780, brick and stone on concrete piling.

Tillsonburg, Ont.
School, cost $31,000. Architect, Mr. McNichol, Woodstock. General contractor, Tillson Co., Tillsonburg. New furniture and fittings required.

Winnipeg, Man.
Moving picture theatre, Portage and Colony streets, for Chas. P. Morgan. Architects, Jordan & Over, 442 Bannantyne. Carpenter, S. B. Ritchie, 214 Chambers of Commerce. Roofing, Fonseca Roofing Co., Builders' Exchange. Plumbing and gas, J. Plaxton Co., 244 Main street. Cut stone, S. Hart, Hetherington and John street. One storey, 44 x 130, brick and stone construction. tion.

Weyburn, Sask.
Post office, cost $65,000, Souris ave. General contractor, Lavin Bros. Plumbing and heating, Gallagher & Walker. Roofing, Hochal & Carmichael. Two storeys, 55 x 90, brick and stone construction.

Collegiate School, cost $75,000. General contractor, Brandon Construction Co., Brandon, Man. Three storeys, brick and stone.

Business Buildings and Industrial Plants

Calgary, Alta.
Two warehouses, cost $30,000, 11th street east and 17th avenue and 10 th St. W. cor 11th avenue, for Canadian Natural Gas Co. Architects, Fysche Martin Co., Crown Block. Three storeys, 50 x 30, brick construction. Plans in preparation.

Store additions, cost $8,000, for Mr. Frizzle, 9th avenue east. 50 x 60. Plans in preparation.

Hamilton, Ont.
Addition to factory, cost $30,000, for Otis-Fensom Elevator Co., Victoria N. Architect, Stewart & Witton, 7 Hughson street south. 212 x 90. Tenders open.

Steel plant for Buffalo Brake Beam Co. Interested, W. M. Currie, Freeman Place. Architects, Prack and Perrine, Sherman avenue north. Plans in preparation.

Maisonneuve, Que.
Store and residence, cost $3,000, St. Catherine and Letourneaux street, for Geo. Dubois, Bonsecour Market. Brick veneer construction. Work started.

Ottawa, Ont.
Shop and dwelling, cost $7,500, Elgin street, for F. A. Macgee. Architect, J. A. Ewart, Sparks Chambers. 24 x 60. Plans ready.

St. Catharines, Ont.
Factory, cost $35,000, Thorold road, for Whitton Barnes Mfg. Co. Manager, W. Elliott. One storey, 100 x 30, brick and cement construction. Tenders open.

Saskatoon, Sask.
Warehouse, cost $70,000, for Winnipeg Paint & Glass Co. Site secured and plans in consideration.

Swift Current, Sask.
Warehouse for Swift Current Grocery Co., Moose Jaw, Sask. Two storeys, 75 x 120. Plans prepared.

Toronto, Ont.
Warehouse, cost $25,000, S.E. corner Bathurst and Wellington street, for American Hat Frame Mfg. Co. Architect, Isadore Feldman, 199 Yonge street. Three storeys and basement, brick and concrete. Tenders called.

Stores and office building, cost $15,000, for Wm. Rowntree, Cor. Mavety and Humberside ave. Architect, P. R. Wright, 332 Clendennan ave. Three storeys, stone and brick. Tenders open.

Alterations, business building, for Rice Lewis & Son, cor. King and Victoria streets. Architect, E. J. Lennox, 164 Bay street. Tenders open.

Weyburn, Sask.
Dairy plant, for The Saskatchewan Dairy Co. (successors to Moose Jaw Dairy Co.). Tenders called. Work to start June 1st.

Westover, Ont.
Mill dam, cost $7,000, for Robert Lindsay. Plans in preparation.

CONTRACTS AWARDED

Calgary, Alta.
Hotel, cost $20,000, Banff street, for N. Luxton. Architect, A. J. McDonald, Calgary. General contractor, A. A. Rose Lineham Block. Three storeys, 60 x 130.

Store house, cost $4,500, 1st street W., for Pryce Jones Ltd. Architects, Hodgson & Bates. General contractor, G. H. Archibald & Co., Box 1739. One sty., 40 x 100, brick veneer construction.

Stores, cost $5,000, Sunnyside, for Neame & Co., 509 MacLean Block, architect and general contractor. One storey, 50 x 90, frame construction. Plans ready.

Stores and rooms, cost $28,000, 17th ave., for G. Calhoun, 923 4th ave. west. Architect, Leo. Dowler. Three storeys, 35 x 94.

Warehouse and machine shop, cost $6,000, for Can. Western Natural Gas Co. Architects, Holman & Gotch. General contractor, Fyshe Martin & Co., Dom. Bank Building. Two storeys, 50 x 30, brick veneer.

Warehouse, cost $30,000, 11th ave., for L. M. Roberts, High River, Alta. General contractor, A. J. Richards, 617 11th ave. west. Three storeys, 50 x 120, mill construction.

Hamilton, Ont.
Boiler house for E. T. Wright Company, Cathcart and Kelly streets. Architects, Stewart & Whitton, 7 Hughson south. General contractor, Geo. E. Mills, King street east.

Keewatin, Ont.
Grain elevator for Lake of Woods Milling Co., Kenora, Ont. General contractor, Carter, Halls & Aldinger Company, Union Bank Building, Winnipeg. 50 x 100.

Lennoxville, Que.
Extension to hotel, cost $10,000, for A. E. Cooper. General contractor, J. V. Laplante, Sherbrooke, Que. Four stys., 50 x 40, brick.

Lethbridge, Alta.
Addition to offices, cost $42,000, Third ave. south, for R. E. Shirlock, Shirlock Block, Lethbridge. Architects, Dodd & Carvet, Lethbridge. General contractors, Smith Bros. & Wilson, 8th street. Two storeys, 50 x 125.

Montreal, Que.
Store and tenements, for Denis Messier, 1 St. Germain street. Architect, J. D. Viau, 76 St. Gabriel street. General contractor, U. Sauvaugeau, Duquette and Chambly. Three storeys, 75 x 75.

Garage, cost $5,000, Stanley street, for Wm. M. Birks, 294 Stanley street. Architects, Nobbs & Hyde, 49 Beaver Hall Hill. General contractor, Wm. M. Irving, 6 Guy Block. One storey, 15 x 24.

Factory, cost $7,000, St. Urbain street, for Estate of D. Ouimet, 107 St. James street. General contractor, Gilbert Demers, 1215 St. Denis street. Three sty., 24 x 75, brick.

Addition to store and factory, cost $3,000, St. Lawrence street, for Carl Rosenberg, 60 Sherbrooke street west. Architects, Dufort & Decary, 25 LaPatrie Bldg. General contractor, McGregor & Reid; 14 Guy Block. 4-sty., 80 x 40, brick. Tenders for rest of work called shortly.

Dross burner building, cost $2,500, for Imperial Wire & Cable Co., Ltd., Guy street. General contractor, Phoenix Bridge & Iron Works, Colborne street. One storey, 30 x 70.

Addition to stables, cost $13,000, for Guaranteed Pure Milk Co., 875 St. Catherine street west. Architects, Hutchinson, Wood & Miller, 53 Royal Insurance Bldg. General contractors, Reid, McGregor & Reid, 747 St. Catherine W. Roofing, Geo. W. Reed & Co., 37 St. Antoine street. Four storeys, 36 x 56, brick construction.

Extensions to warehouse, cost $15,000, Benoit street, for Fraser Viber Ltd., 209 St. James street. Architects and contractors, Simpson & Peel, 10 Benoit street. Elevator, Otis-Fensom Co., Ltd., 368 St. James street. Mason and brick, Jas. Morison, 207 Guy street. Carpenter, Simpson & Peel, 10 Benoit street. Painting and glazing, E. T. Houghton, 76 St. Famille street. Plumbing and heating, Whyte & Delaney, 38 Berthelet street. Roofing, Richardson Simard Co., 129 Elgin. Structural steel, Structural Steel Co., Ltd., Longue Pointe, Que. Three storeys, 42 x 70, brick and stone.

Warehouse, cost $3,500, St. James st., for Imperial Wire & Sable Co., Guy street. Architect is owner. General contractor, Shearer, Brown & Wills, Ltd., 2255 St. Patrick street. One sty., 48 x 95, brick construction.

Ottawa, Ont.

Hotel, cost $7,500, Rideau street, for White & Robertson. Architects, C. J. Burritt, Sparks Chambers. General contractor, Alex. Christie. Brick construction.

Tool house and stable, cost $7,000, Catherine street. Owner and general contractor, J. Henry, Catherine street.

Factory, cost $20,000, on Armstrong street, for The Dominion Wire Mfg. Co. General contractor, A. J. Toms, 283 Flora street. Two storeys, 100 x 42, solid brick construction.

Factory. Owner and general contractor, J. R. Shaw, 242 Bessescr. 33 x 50, solid brick construction.

Queenston, Ont.

Canning factory for Sanitary Packing Co., Ltd., Weston, Ont. President, W. G. Trethewey, 28 Toronto street, Toronto. Architect, Chas. Borter, Niagara Falls. General contractor, Smith & Son, Niagara Falls. Frame construction.

St. Catharines, Ont.

Store and residence, cost $7,600, for Mr. Donova, cor. Paul and Court street. Architect, Mr. Wiley. General contractor, Newman Bros., St. Catharines. One storey, 44 x 64, brick.

Tillsonburg, Ont.

Six stores and dwellings, cost $[illegible],000, South Broadway, for C. H. Mabee. Architect, W. H. Jackson & Son. General contractors, West & Jackson. Mason, W. Berry. Iron Work, Hamilton Bridge Works, Hamilton. Two storeys, 98 x 120.

Winnipeg, Man.

Warehouse, Ellen street, for Walker & Turner. Architects, J. M. Semmens, 903 McArthur Bldg. Carter, Halls Aldinger Co., Union Bank, received contract for two freight elevators, boilers, dynamos, etc.

Residences

Calgary, Alta.

Apartment block, 5 storeys, cost $200,000, for Mr. Stokes, Empire Hotel. Architect, Mr. Wells. Plans in preparation.

Residences, cost $10,000, Cossar St., for Geddes & Sheffield, 1st street east. Architects, Holman & Gotch, Calgary. One storey, 20 x 36. Tenders called.

Apartment house, cost $4,000, Sixth street west, for Scott & Hartronft, 220 Grain Exchange. Architect, Mr. O'Gara, McDougall Block. Three storeys, 100 x 50. Tenders called.

Montreal, Que.

Residence to cost $8,000, 150 Durocher street, for J. W. D'Arcy, 7 Thornhill ave., Westmount. Architects, Wright & Son, 204 St. James street. Three stys., 26 x 56. Work started.

Flats, cost $12,000, for Wm. Jacob, 52 McGill College ave. Architect, D. J. Crighton, Jacobs Bldg. Three storeys, stone and cement. Plans ready.

Residence to cost $40,000, for A. Lionais, 713 St. Hubert street. Architect, Eug. Payette, 103 Francois Xavier St. Brick and stone. Tenders received about July 1st.

Apartment house, cost $7,000, for Dr. F. T. Tooke, 368 Mountain ave. General contractors, Byers & Anglin, 65 Victoria street. Tenders received for electric wiring, plumbing and heating.

Port Credit, Ont.

Bungalows, for International Investment Company, Limited, 296 Yonge St., Toronto. Architect, H. Bryan Gilbert, 47 Wellington street east. Two stys., brick construction.

Saskatoon, Sask.

Apartments, 11th street and Thorne ave., for Anderson & Morton. Architects, Bugenhagen & Turnbull. Three storeys. Tenders open.

Toronto, Ont.

Two detached dwellings, cost $5,200, for Fred Woods, 158 Fairview ave. Builder, E. Post, 214 Fairview ave. 2½ storeys. Tenders open for all trades but carpentry.

Two residences, cost $6,000, Defoe and Massey streets, for R. H. Graham, 862 College street. Architect and general contractor, W. P. Graham, 289 Roncesvalles avenue. Excavation, H. Jones, Florence street. Mason, R. McDonald, Toronto. Two storeys, 15 x 40. Tenders on other contracts received until June 15.

Residence, cost $3,000, Bowden ave., for D. E. Smith (in trust), 77 Victoria street. 2½ storeys, 22 x 29, brick and stone. Tenders closed May [illegible].

Residence to cost $10,000, Lyndhurst ave., for Redmond & Begg, Kent Bldg. (in trust). Plans ready. Two storeys, brick.

Residence, cost $4,500, west side Barrett ave., for F. R. Baumhard (in trust), 250 Gladstone ave., architect and builder. Two storeys, 25 x 25, brick and stone. Builder will accept tenders for plumbing, heating and painting.

Residence to cost $3,000, Plater Cros., for Geo. Sutherland, 40 Dearbourne ave., architect and builder. 2-sty., brick. Tenders open for all trades but carpentry.

Residence, cost $4,800, E.S. Hain ave., for E. C. Finch, 142 Sunnyside ave., architect and builder. Two storeys and attic, brick and stone construction. Tenders open.

Residence, cost $4,000, Pape avenue, for Jas. Bodie, 159 Victor ave., architect and builder. Two storeys and attic, brick. Tenders open.

Residence, cost $3,000, for J. F. Gohn, 266 Bellwoods ave. Architect, J. G. Hedges, 34 Yonge street. Two storeys, stone and brick. Tenders open.

Apartments, cost $15,000, Avenue road and Foxbar road, for Frank Babcock, 294 Indian road. Architects, Edwards & Saunders, 18 Toronto street. Three storeys, brick. Plans and tenders will be called if city will allow the architect to build.

Residence, cost $3,000. Owner and builder, G. H. Crouch, 911 Dovercourt road. Two storeys and attic, brick and stone constroction. Tenders open.

Residence, cost $2,500, North Lisgar street, for Geo. H. Paul, 16 Stonehouse Crescent. Brick and stone. Tenders open for plumbing, heating and painting.

Two residences, cost $5,000, Shaw St., for F. D. Bowerman, 371 Ossington ave. Architect, W. G. Hunt, 990 Bloor street. Two storeys and attic, 33 x 40. Tenders open.

Residence, cost $6,000, St. Clair ave., for Dr. Chas. O'Rielly, 52 College St. Architects, Sharp & Brown, 18 Wellington street east. 2½ storeys, brick construction. Plans prepared.

Two residences, cost $5,000, Lansdowne ave., for W. M. Metford, 56 Quebec ave. Architect, W. G. Hunt, 990 Bloor street west. Two storeys, brick and stone. Tenders open.

One pair detached residences, cost $3,000, for G. Hopkins, 46 Doel avenue. Builders, Bedford & Cross, 254 Jones ave. Brick and frame construction. Tenders open for plumbing, painting and glazing, heating and wiring.

Westmount, Que.

Residence, cost $15,000, for Mr. John Archibald, 4115 Sherbrooke street. Architect, B. J. Turner, 116 Board of Trade Bldg. Tenders called.

Residence, cost $14,000, Springfield ave., for John H. Hand, 609 Belmont street. Architects, Wright & Son, 204 St. James street. Two storeys and basement, 30 x 46, brick and concrete. Work started.

Semi-detached residences, cost $8,500, Burton ave., for D. McLennan, 1223 Green ave. Plumbing and heating, J. H. Gardner & Bro., 1223 Green ave. Plans ready.

Residence, cost $12,000, Sydenham ave. for Howard E. Mann, Belmont ave. Brick and concrete. Tenders open. Excavation started.

Semi-detached residence, cost $4,500, Thornhill ave., for S. Pitt, 488 Argyle ave. Architect, G. G. MacPherson. Two [illegible] and basement, [illegible] x 25. Plans ready.

Winnipeg, Man.

[illegible], cost $7,500, for F. Whit[illegible], c/o The Hall Co., Ltd., Lombard street. Architect, J. W. Crayston, 572 [illegible] ave. Two storeys and attic, 32 ft. [illegible] in. x 36 ft. Tenders open.

CONTRACTS AWARDED

Calgary, Alta.

Residence, cost $5,000, Royal Simalta. Owners and general contractors, Stubbs & [illegible], 1223 12th avenue west. Two storeys, 26 x 34, brick veneer.

Two residences, cost $7,000, Regal Terrace. Owners and general contractors, Collins Bros., 1235 12th ave. west. Two storeys, 22 x 28.

Residence, cost $6,000, for M. D. Geddes, 707 1st street east. General contractor, R. N. Bolton, 2328 1st street. Two storeys, 24 x 36.

Residence, cost $5,000, Royal Simalta. Owner and general contractor, M. W. Walters, 14 Elma Block. Two storeys, 30 x 30.

Four residences, cost $8,000, Mount View. Owner and contractor, J. W. McDonald, 1019 5th ave. west. Two stys., 18 x 32.

Residence, cost $4,000. Owners and contractors, McInnes Bros., 1020 13th ave. west. Two storeys, 22 x 41, brick veneer.

Residence, cost $6,500, 15th ave., for Rev. D. A. McKillop. Architect, Mr. Hay, Calgary. General contractor, E. D. Lancaster, 1508 19th ave. west. Two storeys, 36 x 34.

Residence, cost $5,000, Mt. Royal, for T. A. Hornibrook, 8th ave. west. General contractor, E. D. Lancaster, 1508 19th ave. west. Two storeys, 34 x 31, frame construction.

Residence, cost $6,000. Mt. Royal. Owner and general contractor, H. J. Rowan, 825 14th ave. west. Two stys 40 x 34, brick veneer. Plans ready.

Residence, cost $5,000. Owner and general contractor, J. A. Marple, 1230 13th avenue west. Two storeys, 18 x 36.

Residence, cost $5,000, Parkdale St. Owners and contractors, Scott & Hartronft, 202 Grain Exchange. Architects, Holman & Gotch, Calgary. Two stys., 30 x 38.

Residence, cost $4,000, Mt. Royal, for H. K. Richardson. General contractor, W. W. Duncan, 1925 5th street west. Two storeys, 30 x 30.

Residence, cost $5,000, E. Calgary, for W. Bannister. General contractor, Collins Bros., 1426 14th street east. Two storeys, 30 x 30.

Two residences, cost $5,000, Sunnyside street. Owners and contractors, Auld & Crosby, 807 3rd ave. n.w. Two storeys, [illegible] x [illegible].

Apartments, cost $15,000, 6th avenue, for E. G. King, 329 6th ave. west. Architect, Leo. Dowler. General contractor, W. E. White. Two storeys, 42 x 60, brick.

Residence, cost $5,000, 14th ave., for J. E. Hammond. General contractor, J. Craig, 521 15th ave. west. Two stys., 32 x 32, brick construction.

Three residences, cost $6,000, Ceepeear Ave, for F. C. Lowes & Co., 1st street west. General contractor, W. Tosh, 225 14th ave. west. One storey, 32 x 34, frame construction.

Two residences, cost $5,000. Owner and general contractor, J. L. Davidson, 1833 30th ave. west. Two storeys, 26 x 34.

Residence, cost $7,000, Elbow Park. Owner and general contractor, W. Peacock, 618 23rd ave. west. Two storeys, 26 x 32.

Three residences, cost $6,000, Balmoral. Owner and general contractor, F. Daniels, Room 16 Alexander Corner. Two storeys, 18 x 34.

Residence, cost $5,000, Houndsfield Heights. Owner, C. A. Maus, 423 15th street west. Two storeys, 32 x 29, frame construction.

Residence, cost $6,000, Riverside ave. Owner and general contractor, J. M. Lownders, 124 8th ave. east. One sty., 22 x 26, Plans ready.

Residence, cost $4,000. Hillhust. Owner and general contractor, O. W. Manzer, 1146 Sydenham ave. Two stys., 24 x 38, frame construction.

Residence, cost $17,000, Mt. Royal, for W. Hunt, Alexander Corner. Architect, A. Pirie, Board of Trade Bldg. General contractor, R. A. Knox, Board of Trade Bldg Two storeys, 56 x 40 brick veneer construction.

Residence, cost $4,000, Elbow Park, for W. D. Milner, c/o F. C. Lowes & Co., 1st street west. Architects, Holman & Gotch. General contractor, A. B. Himmelman, 2416 5th street west. One storey, 35 x 32.

Residence, cost $4,500. Owner and general contractor, J. H. Garden, 110 Garden Crescent. Two storeys, 38 x 28.

Two residences, cost $5,000, Sunnyside. Owner and general contractor, G. W. Rae, 1119 5th ave. west. Two stys., 18 x 32.

Two residences, cost $4,500, Balmoral, for J. Breeton, 814 2nd street east. General contractor, Rodgers Bros., 123 34th ave. s.w. Two storeys, 19 x 34.

Hamilton, Ont.

Alterations to residence, cost $4,000, for Lindsay A. Wardell, Cor. Hunter and Bay streets. General contractor, T. J. Drake, Earl street.

Montreal, Que.

Flats, cost $4,500, Chabot street. Owner and general contractor, Jas. Laframboise, 228 Boyer street. Three storeys, 25 x 42, brick construction.

Residence, cost $12,000, Drummond street, for Mrs. E. H. Carter, 128 Bishop street. Architects, Wright & Son, 204 St. James street. General contractor, J. H. Hand, 609 Belmont ave., Westmount. Three storeys, 52 x 35,

Residence, cost $5,000, St. Denis St., for Theo. Bernard, 1136 Vaudre street. General contractor, A. Rousseau, 1397 St. Hubert street. Three storeys, 25 x 80, brick and stone.

Flats, cost $5,500. Owner and general contractor, Geo. Besner, 1914 St. Denis street. Three storeys, 25 x 50, brick veneer.

Residence, cost $15,000, Edgehill ave., for A. Racine, 340 St. Paul street. Architects, Dufort & Decarie, La Patrie Bldg. General Contractor, J. B. Gratton & Co., 82 Mercier ave.

Six semi-det. residences, cost $18,000, Oxford street and Notre Dame de Grace. Owner and general contractor, Henry Gaffney, 13 St. John street. Two sty., and basement, 22 x 38, Foundation started.

Residence, cost $25,000, Delorimer ave., for Catholic School Commissioners of St. Gregoire Parish, 880 Mount Royal ave. Architect, Chas Bernier, 70 St. James street. General contractor, E. Dussault, 85 Lasalle ave. Electric wiring, Wm. Rochon, 454 Parc Lafontaine. Plastering, P. Larocque, 430 Gilford St. Painting and glazing, S. A. Lanctot, 441 Marquette street. Plumbing and heating, J. A. Vaillancourt, 692 Papineau ave. Roofing, J. E. Hardy, 666 Papineau ave. Four storeys, 40 x 48, stone and brick construction.

Residence, cost $7,500. Owner and contractor, E. McFarland, 2044 Esplanade ave. Three storeys, 27 x 58, brick veneer.

Two residences, cost $8,000, City Hall ave., for Mrs. A. Desauluiers, 987 St. Denis street. Architect, Alphonse Piche, 52 Victoria Bldg. General contractor, L. Langevin, 228 Parc Lafontaine. 3 storeys, 25 x 50,

Residence cost $25,000, Cedar avenue, for Dr. J. D. Morgan, Union ave. Architect, Morgan Company's staff, Beaver Hall Hill. Roofing, Geo. W. Reed & Co., Ltd., 37 St. Antoine street. Four storeys, 58 x 53, brick and stone construction.

Residence, Cor. Nelson and Strathearn, for Howard Murray. Architects, Peden & McLaren, 20 St. Alexis street. General contractor, J. J. Kirkpatrick, 20 William street. Plumbing, Tom Bain, 155 Guy street. Roofing, Geo. W. Reid & Co., Ltd., 37 St. Antoine street. Two storeys, brick construction.

Residence, cost $4,300, Old Orchard ave., for D. Hebert, 805 Albert street. General contractor, Dom. Cusson, 194 Prudhomme ave. Two storeys, 25 x 61, brick construction. Excavation started.

Ottawa, Ont.

Residence, cost $4,000, Powell avenue. Owner and general contractor, R. A. Kemp. 25 ft. x 36 ft., brick veneer.

Residence, cost $3,000, Spadina ave., for T. W. Joyce. General contractor, C. D. Joyce, 1102 Somerset street. 27 x 35, brick veneer.

Residence, cost $4,000, Oakland, for Adam Kemp, General contractor, R. A. Kemp, 149 1st ave., Ottawa. 25 x 36, brick veneer.

Residence, cost $4,000, Oakland, for Frank Hannam. General contractor, R. A. Kemp, 149 1st ave. 25 x 36, brick veneer.

Outremont, Que.

Residence, cost $12,000, St. Catherine road, for Eugene Desmarais. General contractor, Mt. Royal Construction Co., 287 St. Denis street. Four storeys, 39 x 60, solid brick construction.

Residence, cost $3,600, McKeller Townsite, for Mrs. F. L. Moore. Architect, M. C. Edey, 71½ Sparks street. Concrete blocks, Boyde Bros., Osgoode Station, Ont.

Residence, cost $18,000, St. Catherine road, for C. Legault, 110 Park avenue. Architects, MacDuff & Lemieux, Merchants, Bank Bldg., University street. General contractor, H. Martin, 438 St. Antoine street. Mason and stone, Corbeil & Frere, 192 Clarke street. Plumbing, heating and roofing, D. Charest, 25 Mance street.

Residence to cost $2,500, Bessener street. Owner and contractor, W. H. Davis, 152 Bessener street. 18 x 36, brick veneer.

Residence to cost $4,000, Sunnyside avenue. Owner, Chas. Band. General contractor, Patrick Clement, 624 Cooper street. Brick veneer.

Residence to cost $2,500, Sunnyside avenue. Owner and general contractor, Thos. Hawkins, 166 Sunnyside avenue. 18 x 34, brick veneer construction.

Residence to cost $4,500, Oakland, for J. A. Gierson. General contractor, Robt. McKingstry, 91 2nd avenue. Brick veneer. Work started.

Residence to cost $4,500, Goulbourn. Owner and general contractor, J. F. Tradburks, 91½ Sparks street. Brick veneer construction.

Two detached residences to cost $6,000, Grosvenor street, for Madam Fait. General contractor, W. J. Fitzpatrick, 760 Echo Drive. 24 x 32 and 28 x 24, brick veneer construction.

Residence to cost $4,000, Church st. Owner and general contractor, Jas. Wolinsky, 362½ Murray street. 30 x 60, double brick veneer construction.

Apartments to cost $18,000, Cooper street, for A. Digin, 216 Bessever street. General contractor, Jas. Mather, 110 Wellington street, 48 x 100, brick construction.

Residence to cost $11,000, 1st avenue, for Mrs. R. Clarke. Architect, W. H George, Castle Bldg. Excavation and mason, G. Eamon. Brick and stone.

Residence to cost $6,000, Mutchmore, for F. B. Reid. General contractor, N. Hollister, 512 Bay street. Brick veneer construction.

Residence to cost $5,000, Powell ave., for Carl Engler. General contractor, Geo. Eaman & Sons, Isabella street. Brick veneer.

Residence to cost $8,000, Clemow ave., for Dr. Graham. Architect, W. Herbert George, Castle Bldg. Excavation and mason, Geo. Eaman. Carpenter, Davis & Rundle. Brick veneer.

Alterations to apartments to cost $6,000, Emmett street, for Mrs. Mary Clark. General contractor, J. R. Howe, 324 Mutchmore avenue. Brick veneer.

Residence to cost $5,000, St. Patrick street. Owner and general contractor, Mandrake Landerville, 82 Albert street. 33 x 28, brick veneer.

Red Deer, Alta.

Residence to cost $2,500, East avenue, for Dr. Plaxton. General contractor, C. T. Eline. 1½-sty., 24 x 30.

Residence to cost $4,000, Park street. Owner and general contractor, G. H. Murrin. 2-sty., 31 x 31.

Simcoe, Ont.

Residence to cost $4,500, for Wm. Gilbertson, contractor. Architect, George Buckley.

Residence to cost $10,000, for C. E. Innes and Chas. Innes, general contractors. 3-sty., brick. Work started.

Toronto, Ont.

Two pair semi-detached residences to cost $75,000, for W. H. I. Stevens, 273a Salem avenue, architect and builder. 2-sty., brick and stone.

Residence to cost $5,000, Parkwood ave., for Ellen Walsh, 37 Adelaide street E. Architect, S. Nesbitt, 25 Springhurst avenue. Builder, J. Walsh, 37 Adelaide street. 2½-sty., brick and stone.

Four pair semi-detached dwellings to cost $20,000, Carlaw and Guelph ave., for Mrs. A. B. Wren. Architect, J. A. Taylor, 132 Riverdale ave. Builder, J. S. Wren, 16 Victor ave. two storeys, and attic, 32 x 34, brick.

Residence to cost $2,600, 929 Dufferin street, for Mrs. E. Cohen, 165 Lowther ave. Architect, G. H. Stanton. Builder, Crouch & Co., 911 Dovercourt road. 2-sty. and attic, 16½ x 42.

Three attached residences to cost $6,000, Cairns ave. Owner and builder, G. J. Hedges, 34 Yonge street. 2-sty., brick and stone.

Westmount, Que.

Two residences to cost $10,000, Lansdowne avenue. Owner and contractor, Isaac Collins, 207 Ash avenue. 3-sty., 25 x 52.

Residence to cost $13,500, Belmount street, for R. J. Williamson, 242 Fairmount avenue. General contractor, G. W. Goodbody, 549 Durocher street. Brick and concrete.

Residence to cost $42,000, Winchester street, for J. H. Gardner & Bros., 123 Green avenue. Carpenter, D. McLean, Guy avenue. Plans ready.

Residence to cost $12,000, Sydenham avenue, for G. H. Clarke, 2294 Hutchinson street. Architect, McDowell & Henderson, Bank of Toronto Bldg. Mason and carpenter, Irving, 6 Guy Block. 2-sty., 30 x 46, brick and concrete.

Winnipeg, Man.

Residence for J. A. McCormack. Architect, Edgar Prain, 313 Fort street. General contractor, J. Bratton, 408 Home street. 1½-sty., 28 x 38.

Residence to cost $8,000, Harvard ave., for H. W. Eyres, 860 Grosvenor avenue. General contractor, S. M. Cameron, 36 Alloway street. Architect, Edgar Prain, 313 Fort street. 2½-sty., 30 x 30.

Power Plants, Electricity and Telephones

Bassano, Alta.

Power house supplies for The Bassano Electric Power & Traction Co. President, S. E. Whiting. Engineers, Bowring & Logan, Winnipeg, Man. Tenders received for electric generating station equipment comprising two return tubular steam boilers, 1 steam engine, and 1 electrical generating equipment. Plans at office of McLean Daily Reports, Toronto and Montreal.

Battleford, Sask.

Electrical machinery. Tenders received by Engineer, Supt. Martin, for 2 turbo generators directly connected with two 250 h.p. Mirrless Deisel engines. Switchboards and instruments of latest type.

Birds Hall, Man.

Power installation for City of Winnipeg. Plans at office of Engineer J. G. Glassco, 54 King street. Tenders called.

St. Thomas, Ont.

Extension to sub-station for St. Thomas Light, Heat & Power Dept. [illegible] Caughell, acting manager. Plans considered.

Winnipeg, Man.

Electrical apparatus. Engineer, J. G. Glassco, 54 King street. The City Council are contemplating purchase of one 75-h.p. electric motor to cost about $750; two 50-h.p. electric motors to cost about $900; one 100-h.p. electric motor to cost about $970.

Business Notes

Brantford, Ont.

Factory on Sydenham street, of Farmers' Binder Twine Co., Ltd., burned. President, Mr. Frank Leeming, Brantford. Loss $75,000.

Hamilton, Ont.

Factory of Diamond Flint Glass Co. burned; manager, Jas. W. King. Loss $35,000. New building to be erected at once and new machinery installed.

Buildings at Edward New's gravel pits at 557 King west, destroyed; loss about $10,000. New machinery and motors will be required.

Toronto, Ont.

The management of the Toronto Daily Star are contemplating installing a complete photograph etching plant. Address Mr. J. E. Atkinson, owner and managing director, 18 King street west.

New Companies

The Hayes Development Company, Limited, has been incorporated with a capital of $40,000 to erect buildings and deal in all kinds of building materials with head office at Toronto. The provisional directors are J. C. Hayes, E. W. Pratt and S. A. Morrison, all of Toronto.

Kensington Annex Limited, has been incorporated with a capital of $70,000 to carry on business as builders and dealers in builders supplies with head office at Toronto. The provisional directors are, J. B. Bartram, A. Poyntz and J. R. Johnston, all of Toronto.

Meaford Brick Company Limited has been incorporated with a capital of $500,000 to manufacture and deal in terra cotta, stone, cement, lime and building materials of all kinds with head office at Toronto. The provisional directors are Hon. F. H. Phippen, F. C. Annesley and M. B. Baker, all of Toronto.

The McRae Manufacturing Company, Limited, has been incorporated with a capital of $100,000 to carry on business as lumberers, saw and planing mill proprietors, manufacturers of all kinds of wood products, &c., with head office at Port Arthur. The provisional directors are A. J. McComber, D. E. Poole and Walter S. Ruttan, all of Port Arthur.

The Intercities Quarries Company, Limited, has been incorporated with a capital of $500,000 to deal in stone, cement, gravel, tiles, brick and all kinds of building material, with head office at Port Arthur. The provisional directors are W. F. Langworthy, F. J. Whitaker and A. J. McComber of Port Arthur.

The Home Land Company Limited, has been incorporated with a capital of $40,000 to erect buildings and deal in all kinds of building material, with head office at Toronto. The provisional direc-

(Continued on page [illegible])

Tenders and For Sale Department

To Architects and Engineers

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at any or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

Newmarket Public School

Sealed tenders (separate or in bulk) will be received by the architect up to **the evening of June 15th**, for the erection of a six-roomed public school in the Town of Newmarket.

The building will be of stone and brick with artificial stone trimmings; flat roof, plumbing, warm air heating.

Plans and specifications may be seen at the Architect's office and also at the office of Contract Record, Toronto, on and after May 25th.

The lowest or any tender not necessarily accepted.

Dr. C. H. R. CLARK,
Chairman of Board.

O. E. TENCH, Architect,
Newmarket, Ont.

TENDERS

For Drainage Work

Stanley Township

Tenders for Drainage Work of by-law **11-1911**, estimated at 30,500 cubic yards, will be received by the undersigned up to **June 8th, 1912.**

All tenderers must deposit a marked cheque for ten per cent. of their proposed contract price with their tender. Copies of by-law sent on application.

The lowest or any tender not necessarily accepted.

ROBT. J. RICHARDSON,
Clerk of Stanley Township,
Varna, Ont.

21-23

Special Notice to Contractors

Could supply you with any quantity of RELAYING RAILS or for REINFORCING CONCRETE at a very low price, B. Shragge Iron & Metal Company, 396 princess street, Corner King; Telephone St. John 382, Winnipeg. 11-23

Water Works Improvements

Tenders wanted for the following additions to the Water Works at Berlin, Ont.:

(a) Half million gallon elevated water tower.
(b) Covered concrete reservoir 100 ft. x 200 ft., including 8,000 cubic yards excavation.

For further information apply to

WATER COMMISSIONERS,
Berlin, Ont.

22

Berlin, May 15th, 1912.

CITY OF VERNON, B.C.

Tenders, in duplicate, for Electrical Equipment, will be received by D. G. Tate, City Clerk, up to Three O'Clock P.M., **June 10th, 1912**, for the delivery F.O.B. Vernon, B.C., of the following:—

1—125 K.W., Three Phase, Sixty Cycle Generator.
1—Exciter, direct connected to above.
1—Five panel Switchboard.
1—Series Tungsten or
1—Arc Lighting System.

Specifications will be on file at the following offices: Canadian Electrical News, Toronto; Contract Record, Toronto; Canadian Engineer, Montreal and Winnipeg, and Mather, Yuill & Company, Limited, Consulting Engineers, Vancouver, B.C. 20-23

City of Moose Jaw, Sask.

Tenders for Cast Iron Pipe and Specials

Sealed tenders marked "Tenders for Cast Iron Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Saturday, June 1st, 1912**, for the following, delivered f.o.b. cars Moose Jaw:

40 ft. 4-in. pipe Class A. weight 20 lbs. per ft.
33600 ft. 6-in. pipe Class C. weight 35.8 lbs. per ft.
2100 ft. 6-in. pipe Class C, weight 52.1 lbs. per ft.
175 3-in. offsetts, Class D.
15 8-in. offsetts, Class D.
100 6-in. Tees, Class D.
12 6-in. off 8-in. Tees, Class D.
15 6-in. x 6-in. x 6-in. x 6-in. Crosses, Class D.
8 6-in. x 6-in. x 8-in. x 6-in. Crosses, Class D.
8 6-in. ¼ bends, Class D.
100 6-in. Plugs.
20 8-in. Plugs.
3 12-in. Plugs.

All pipes and specials must conform to the Standard Specifications of the Canadian Society of Civil Engineers. Tenderers must state the time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.

Moose Jaw, Sask., May 17, 1912. 21-22

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
Chicago, Ill.

t.f.

BASSANO

Tenders for Electric Generating Machinery

Sealed tenders, marked "Tender for Electric Generating Station Equipment" and addressed to S. E. Whiting, Esq., The Bassano Electric Power and Traction Company, Bassano, Alta., will be received by the undersigned at 6 p.m. of the **17th day of June, 1912**, for the delivery and erection of the following machinery and apparatus:

Section "A" Two Return Tubular Steam Boilers,
Section "B" One Steam Engine,
Section "C" One Electrical Generator and Equipment.

A marked cheque for 5 per cent. of the amount of the tender shall accompany each tender.

Tenders are invited for each section separately.

Specifications may be obtained from S. E. Whiting, Esq., Bassano, Alta., or from the Engineers, Messrs. Bowring & Logan, 322 Donald Street, Winnipeg, or may be seen at the office of Norman A. Hill, 43 Victoria Street, Toronto; or, at the offices of the "Contract Record," Toronto and Montreal.

S. E. WHITING, President,
Bassano, Alta.
BOWRING & LOGAN, Engineers,
Winnipeg, Man.

21-22

CITY OF MOOSE JAW SASK.

Tenders for Sewer Pipe and Specials

Sealed tenders marked "Tenders for Sewer Pipe and Specials," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Saturday, June 1st, 1912**, for the delivery of the following f.o.b. cars, Moose Jaw:

4-in. vitrified tile pipe, 1,200 ft.
6-in. vitrified tile pipe, 30,000 ft.
8-in. vitrified tile pipe, 32,000 ft.
10-in. vitrified tile pipe, 5,300 ft.
4-in. off 8-in. T-Y Junctions, 60 pieces.
4-in. off 10-in. T-Y Junctions, 10 pieces.
6-in. off 8-in. T-Y Junctions, 650 pieces.
6-in. off 10-in. T-Y Junctions, 75 pieces.
8-in. off 10-in. T-Y Junctions, 10 pieces.
8-in. vitrified tile channel pipe, 300 ft.
10-in. vitrified tile channel pipe, 75 ft.
8-in. Elbows, 5 pieces.

All pipes and specials must be first class. Tenderers must state time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.

Moose Jaw, Sask., May 17, 1912. 21-22

Tenders for Pavement

Sealed tenders will be received by T. J. Moore, City Clerk, up till noon on **Thursday, June 6th, 1912**, for the excavation and concrete base and curb for a pavement on Suffolk street, containing approximately 9,000 square yards, including 2,150 lineal feet of street railway track and 4,500 feet of curb and gutter.

Further particulars may be obtained at the City Engineer's office.

The lowest or any tender not necessarily accepted.

PUBLIC WORKS COMMISSION,
JOHN KENNEDY, Chairman.
Guelph, May 20th, 1912. 21-22

The Corporation of the City of Vernon

Waterworks Contract No. 1.

Sealed tenders, endorsed "Waterworks Contract No. 1," will be received by the undersigned up to 5 o'clock p.m., **June 10, 1912**, for the supply and delivery of 17,000 feet of 4-inch cast iron pipe and 10,500 feet of 6-inch cast iron pipe. Specifications can be obtained from the City Engineer's office, City Hall, Vernon, B. C. A deposit equal to 5 per cent. of the amount bid must accompany each tender. The lowest or any tender not necessarily accepted.

21-23 D. G. TATE, City Clerk.

NAVAL SERVICE OF CANADA

Sale by Tender of Steamer "KESTREL"

Sealed tenders addressed to the undersigned and accompanied by a certified cheque for $500, will be received up to noon on **Wednesday, the Third day of July, 1912**, for the purchase of the Canadian Government Steamer "Kestrel," lately employed in Fishery Protection dnties on the British Columbia Coast and now lying at H.M.C. Dockyard Esquimalt, B.C.

Forms of tender, conditions of sale, full particulars of the Steamer and permission to inspect her may be obtained on application from the Officer in charge, H.M.C. Dockyard, Esquimalt, B.C.

Unauthorized publication of this advertisement will not be paid for.

G. J. DESBARATS,
Deputy Minister,
Department of the Naval Service,
—22725 Ottawa, May 3rd, 1912. 20-22

CITY OF MOOSE JAW
SASK.

Tenders for Valves and Hydrants

Sealed tenders marked "Tenders for Valves and Hydrants," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Saturday, June 1st, 1912**, for the supply and delivery of the following f.o.b. cars, Moose Jaw:

75—6-in. Hydrants, 8 ft. 2 in. bury with two hose and one steamer connection.
150—6-in. gate valves with cases and spindles.
15—8-in. gate valves with cases and spindles.

Tenderers must submit a detailed drawing and specifications of the hydrants they propose to supply, and also state time of delivery.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.
Moose Jaw, Sask., May 17, 1912. 21-22

The Corporation of the City of Vernon

Waterworks Contract No. 2.

Sealed tenders, endorsed "Waterworks Contract No. 2," will be received by the undersigned up to 5 o'clock p.m., **June 10, 1912, for the supply** and delivery of 125 gate valves and 36 hydrants, ranging in size from 4-inch to 8-inch. Specifications can be obtained from the City Engineer's office, City Hall, Vernon, B. C. A deposit equal to 5 per cent. of the amount bid must accompany each tender. The lowest or any tender not necessarily accepted.

21-23 D. G. TATE, City Clerk.

Steam Shovels For Sale

The following used steam shovels are for sale and can be delivered promptly.

1—95-ton Bucyrus shop No. 1165 3½ yd. dipper.
1—90-ton Marion New Boiler, 3½ yd. dipper.
3—70-ton Bucyrus shop Nos. 802, 803, 804, 2½ yard dippers.
2—65-ton Bucyrus shop Nos. 745, 747, 2½ yd. dippers.
1—60-ton Marion shop No. 1405, 2½ yd. dipper.
2—45-ton Bucyrus 1¼ yd. dippers.
2—Model 20 Marions, shop Nos. 1084, 1477, 1½ yard dippers, both just rebuilt.
2—Little Giant traction shovels, 1¼ yd. dippers.
2—No. 3 Thews, standard gauge, 1½ yd. dippers.
2—No. 1 Thews, one traction the other one M.C.B. trucks, 1 yard dippers.
3—No. 0 Thews, good shape, ⅝ yard dippers.

Full particulars on request.

Any of the above furnished without boilers if preferred. Our spring bulletin shows a large list of used contractors' equipment for sale. A postal brings it.

MARSH COMPANY,
Old Colony Building,
Chicago, Ill.

Tenders for Dredging

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Dredging, Toronto Harbor, Ont.," will be received until 4.00 p.m. on **Tuesday, June 4, 1912**, for dredging required in Toronto Harbor, in the Province of Ontario.

Tenders will not be considered unless made on the forms supplied, and signed with the actual signatures of tenderers.

Combined specification and form of tender can be obtained on application to the Secretary, Department of Public Works, Ottawa. Tenders must include the towing of the plant to and from the work. Dredges and tugs not owned and registered in Canada shall not be employed [illegible]

Contractors must be ready to begin work within thirty days after the date they have been notified of the acceptance of their tender.

[illegible] accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, for five per cent. (5 p.c.) of the contract price which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept [illegible]

By order,

R. C. DESROCHERS,
[illegible]
Department of Public Works,
Ottawa, May 15, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. [illegible]

Contractors' Attention

We have for sale 3 Ransome Concrete Mixers, Hoisting Engines and other contractors' equipment.

Write us for particulars and prices.

National Sand & Material Co., Ltd.,
20-22 Welland, Ont.

CITY OF MOOSE JAW,
SASKATCHEWAN

Tenders for Ornamental Light Standards

Sealed tenders marked "Tenders for Lamp Standards," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Friday, June 14th, 1912**, for the supply and delivery of 50 Ornamental Light Standards suitable for Tungsten lighting.

Plans, specifications and all information may be obtained from J. D. Peters, Electrical Superintendent, Moose Jaw.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.
Moose Jaw, Sask., May 14, 1912. 21-23

Department of Railways and Canals

Ontario—St. Lawrence Canals.

Murray Canal.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Dredging Murray Canal," will be received at this office until 16 o'clock on **Wednesday, June 5th.**

The specification and form of contract to be entered into can be seen on and after Monday, May 20th, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario-St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $900 [illegible] der, which sum will be forfeited if the party [illegible] the work at the rate stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

[illegible] accepted

[illegible]

[illegible]
Department of Railways and Canals,
[illegible]

Newspapers inserting this advertisement without authority from the Department will not be [illegible]

Tenders for Cement Arch Bridge

[illegible] to 6 p.m. on **Monday, June** [illegible]

[illegible]

[illegible] DAVIS, [illegible] Clerk.

Tenders Wanted

[illegible] shall be [illegible] Alexandra Church," will [illegible] **Wednesday, June 12**, [illegible] required in making changes to an existing Sunday School, and building a new church building, for the Alexandra Presbyterian Church.

All tenders shall be addressed to Dr. W. D. Wiley, Chairman of the Building Committee, Brantford, Ont.

Plans and specifications may be seen at the office of the Architects, Messrs. Taylor & Taylor, Brantford, Ont.

[illegible] tender not necessarily [illegible]

22-23

TENDERS

CITY OF SHERBROOKE

Tenders will be received by the undersigned, up to noon of **June 3rd, 1912**, for a complete portable Asphalt Plant with all the necessary tools required for Asphalt Paving on streets, with hand rollers, etc. Also prices on a five-ton and ten-ton Steam Roller. Full details to be given of the plant tendered for, with the name of every tool and their number, with the capacity of the plant per square yard per day, also the weight. Places to be given where similar plants to the one tendered for are to be seen in working order.

Tenders to be marked "Tenders for Asphalt Plant."

No tender necessarily accepted.

F. J. Guffich,
Secretary-Treasurer.

[illegible] May 21st, 1912 22

TENDERS

Napanee Sewage Disposal Works and Outfall Sewer Napanee, Ontario

Separate tenders will be received by the undersigned up till 12 o'clock noon, **Wednesday, June 5th, 1912**, for the construction of the following [illegible]

[illegible] Disposal Works.

2nd. Contract "B"—Diversion Outfall Sewer to Disposal Works.

Plans and specifications may be seen and all information obtained at the office of the undersigned or at the office of the Engineer, George C. Wright, Kingston, Ontario.

An accepted cheque for Five Hundred Dollars ($500) must accompany each tender.

The lowest or any tender not necessarily accepted.

Tenders must be on special forms supplied by the Corporation.

W. A. GRANGE, Town Clerk,
Napanee, Ont.
GEO. C. WRIGHT, Consulting Engineer,
Kingston, Ont.

May 18th, 1912 22

Tenders Wanted

Tenders will be received until noon, **Saturday, June 1st**, by the Pease Foundry Company, Toronto, for the several trades required in the erection and completion of a manufacturing plant at Brampton for the Pease Foundry Company. Plans at Ellis & Connery's office, also at the Municipal Building at Brampton.

A satisfactory bond will be required for the proper execution of the work.

No tender necessarily accepted.

ELLIS & CONNERY, Architects,
21-22 Manning Chambers, Toronto.

TENDERS

Masonic Temple

Tenders will be received at the office of Messrs. Crane & Pennington, architects, Boug Building, Windsor, Ontario, up to noon, **June 15th, 1912**, for a six-storey Masonic Temple Building. Tenders may be either general or separate. A certified cheque for five per cent. to accompany tender, otherwise the bid will not be considered.

In the reception of tenders for the work the owners incur no obligation to accept the lowest or any tender.

CRANE & PENNINGTON,
Windsor, Ont.

FORT FRANCES

Tenders

Tenders marked "Tender for Sewers," will be received by J. W. Walker, Town Clerk, Fort Frances, for the material for, and for the construction of, 3,728 feet of 15-in. sewer on First and Third streets, and for 558 feet 20-inch sewer on Central avenue, and 530 feet 9-inch catch-basin connections.

Tenders will be received for the work and for the material together or separately. Plans and specifications may be obtained from the undersigned.

The lowest or any tender not necessarily accepted. Tenders will be received up to 6 o'clock p.m., June 1st, 1912.

J. W. WALKER, Town Clerk,
Fort Frances, Ont.

TENDERS

For Bridge Construction

Sealed tenders in separate envelopes plainly marked as to contents will be received at the office of the undersigned as under.

1. Concrete Abutments for a Bridge over a branch of the River Humber, Lot 2, Con. 11, Township of King:—Tenders received up to five o'clock p.m. of **Wednesday, June 5th, 1912.**

2. Concrete Breakwater to protect the highway at or near Woodbridge in the Township of Vaughan, County of York:—Tenders received up to five o'clock p.m. of **Thursday, June 6th, 1912.**

3. Concrete Arch Bridge over a branch of the Don on the Townline Concession 3 between the Townships of York and Markham, County of York:—Tenders received up to five o'clock p.m. of **Thursday, June 6th, 1912.**

Plans and specifications may be seen and all necessary information may be obtained at the office of the undersigned, 57 Adelaide street east, Toronto.

The lowest or any tender not necessarily accepted.

FRANK BARBER,
Civil Engineer.

Toronto, May 16th, 1912.

Tenders Wanted

Separate tenders wanted on the following trades required in the construction of the Foundry Building, Machine Shop, Boiler Shop and other buildings of the new factory of Marsh & Henthorn, Limited, Belleville.

Brick Work, Steel Work, Carpentering, Roofing, etc.

Plans may be seen at the office of the Architect, F. H. Herbert, 65 Adelaide St. E., Toronto, at the office of Mussens Limited, 318 St. James St., Montreal, or at the Head office of the Company, Belleville. Tenders must be received by Monday, June 3rd, Prompt erection essential.

22

New Companies

(Continued from page 71)

tors are F. W. Hill, F. Orford and J. P. White, all of Toronto.

Barber Paper and Coating Mills Limited, have been incorporated with a capital of $1,500,000 to manufacture and deal in all kinds of pulp and paper with head office at Toronto. The provisional directors are G. H. Sedgewick, A. G. Ross and E. V. Macmillan, all of Toronto.

Ledger Realty Limited has been incorporated with a capital of $100,000 to carry on business as a general land and building company, with head office at Toronto. The provisional directors are H. W. Shapely, A. H. Beaton and J. C. M. MacBeth, all of Toronto.

Commonwealth Realty Company, Limited, has been incorporated with a capital of $40,000 to carry on business as a general land and building company with head office at Hamilton. The provisional directors are L. F. Stephens, H. S. Lees and O. D. Peat, all of Hamilton.

Progressive Realty Company Limited, has been incorporated with a capital of $50,000 to construct roads, bridges, sewers, water mains, pipes for light, heat and power, &c., with head office at Montreal. The provisional directors are A. H. Vipond, F. J. Hodgson and Jos. Wilson, all of Westmount.

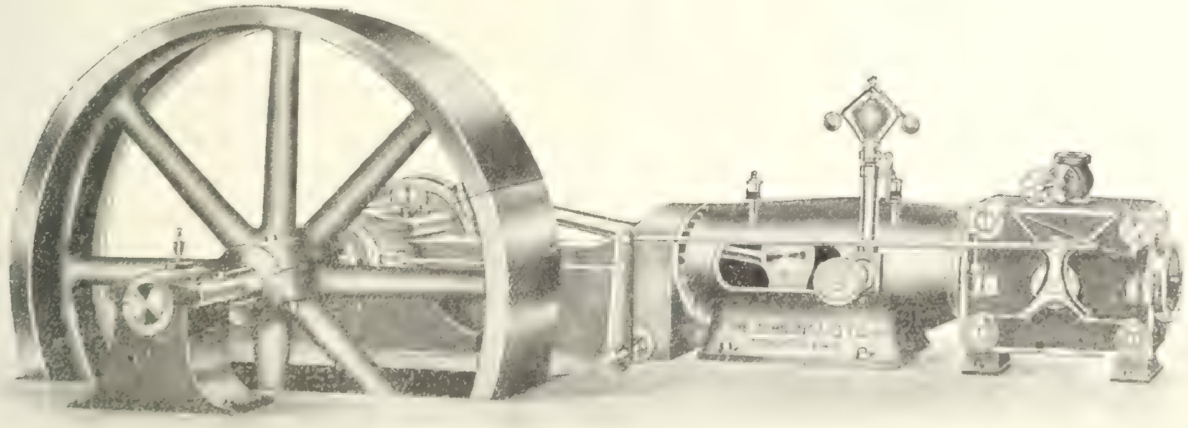
Quebec and St. John Construction Co. Limited, has been incorporated with a capital stock of $1,000,000 to carry on business as architects, engineers, builders, etc., to acquire timber limits, develop mineral lands, etc., with head office at Montreal. The incorporators are C. A. Barnard, K.C., Leo. Barry and E. D. Maguire, all of Montreal.

Morris and Allan Lmited, have been incorporated with a capital stock of $50,000 to carry on business as builders, contractors, dealers in building materials, lumber, stone &c., with head office at Toronto. The incorporators are J. F. MacGregor, J. E. Riley and D. A. McRae, all of Toronto.

Charing Cross Industrial Company, Limited, has been incorporated with a capital stock of $1,000,000 to build and maintain roads, bridges, drains, waterworks, &c., with head office at Montreal. The incorporators are L. N. St. Arnaud, Paul Ethier and E. H. Godin, all of Montreal.

United Contract Company, Limited, has been incorporated with a capital stock of $250,000 to carry on business as general contractors, builders and engineers, with head office at Montreal. The incorporators are R. T. Stackhouse,

INGLIS CORLISS ENGINES



JUDGED by the highest standards of economy, efficiency and small cost of upkeep, Inglis Corliss Engines have never had to acknowledge a superior.

Inglis Corliss Engines are always reliable and have been proved for 35 years. Their steady, positive action has won the confidence of engineers all over Canada.

We also manufacture marine engines, steam and motor driven pumps, penstocks, stand-pipes, presses, tanks, hydraulic machinery, blast furnaces, air compressors, vacuum pumps, etc.

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THE JOHN INGLIS COMPANY LIMITED

Engineers and Boiler Makers **Strachan Ave., TORONTO**

[illegible] Chesney, G. H. Semple and W. H. [illegible], all of Montreal.

Connaught Realty Limited has been incorporated with a capital of $[illegible] to manufacture and deal in building materials and supplies, with head office at Toronto. The provisional directors are G. H. [illegible], W. H. [illegible] and R. H. [illegible], of Toronto.

[illegible] Realty Company, Limited, has been incorporated with a capital of $40,000, to carry on a general land and building business with head office at Toronto. The provisional directors are W. B. Kenderine and C. H. C. Leggott, all of Toronto.

St. Charles Investment Company, Limited, has been incorporated with a capital of $20,000, to acquire timber limits and carry on business as a land and building company, with head office at Winnipeg. The incorporators are S. J. Masters, E. J. Bingham and H. R. McTavish, all of Winnipeg.

St. Lawrence Realty Company, Limited, has been incorporated with a capital of $[illegible], to carry on a general land and building business with head office at Toronto. The provisional directors are T. H. Kilgore, J. H. Oliver and J. A. Reid, all of Toronto.

The York Quarry Company, Limited, has been incorporated with a capital of $75,000, to manufacture and sell all kinds of stone, brick, terra cotta and road-building materials, with head office at Toronto. The provisional directors are F. B. Watson, Jas. Hales and F. H. M. Irwin, all of Toronto.

Shale Products, Limited, has been incorporated with a capital of $150,000, to manufacture and deal in clay, stone, cement, lime and other building materials, with head office at Inglewood. The provisional directors are T. H. Graham, J. M. Scott and J. R. Scott, all of Inglewood.

Wickens Lumber Company, Limited, has been incorporated with a capital of $10,000, to carry on business as lumberers, saw and planing millers and manufacturers of lumber and woodenware, with head office at Wallaceburg. The provisional directors are Andrew Wickens, Geo. Robertson and A. B. Carscallen, all of Wallaceburg.

South Assiniboine Estates Limited have been incorporated with a capital of $100,000, to acquire timber and timber limits, mining rights, etc., and carry on a lumbering, mining and ranching business, with head office at Winnipeg. The incorporators are R. B. S. Jenkins, R. M. Myers and Marshall Anderson, all of Winnipeg.

F. J. Welwood & Company, Limited, have been incorporated with a capital of $500,000, to carry on business as timber merchants, sawmill owners, pulp and paper manufacturers, etc., with head office at Winnipeg. The incorporators are F. J. Welwood, D. Bowman, B. Shragge and D. Munroe, all of Winnipeg.

The Glengarry Lumber Company, Limited, has been incorporated with a capital of $25,000, to manufacture and deal in pulp, paper and other similar products, to carry on business as timber merchants, sawmill proprietors, etc., with head office at Berlin. The provisional directors are P. E. Heeney, C. McDermid, of Berlin, and G. C. Goodfellow, of Montreal, Que.

La Compagnie Manufacturie de Saint Anselme Limitee has been incorporated with a capital of $49,000, to produce electricity for lighting and heating, to construct sawmills, lumber mills, etc., and deal in timber of all kinds, the head office is at Saint Anselme and the incorporators are A. O. Bourbonnais, J. B. Cadrin and C. M. Roy, all of Saint Anselme.

The Lanctot Realty Company, Limited, has been incorporated with a capital stock of $50,000, to act as engineers, architects, builders, etc., to construct tunnels for the transmission of power, light and heat, etc., the head office is at Montreal, and the incorporators are Alphonse Gingras, of Quebec City, J. L. Williams, of Three Rivers, and E. L. Sasseville, of Montreal.

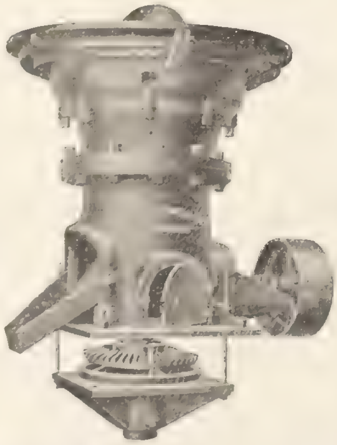
General Improvement and Contracting Company, Limited, has been incorporated with a capital stock of $100,000, to carry on business as contractors and dealers in timber, brick, stone, cement and other building supplies, with head office at Montreal. The incorporators are J. O. Gagnon, L. H. Anderson and Ernest Rainville, all of Montreal.

Albert J. Smith Lumber Company, Limited, has been incorporated with a capital stock of $25,000, to carry on business as general contractors, manufacturers and dealers in timber, lumber, sashes, doors, etc., to acquire limits and cut standing timber, etc. The head office is at Montreal, Que., and the incorporators are A. J. Smith, E. E. Howard and D. H. Howard, of Montreal.

You can buy a Gyratory Crusher for less than you think.

Just investigate the

Bronze Ball Gyratory Crusher



It has been experimented on, developed and perfected by us. It will reduce the cost of your crushed product, by reducing the amount of power consumed, by the low cost for repairs and by the increased capacity.

You cannot afford to let this opportunity go by.

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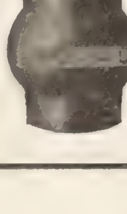


Tenders Wanted

should be advertised for in the Contract Record "Tenders and For Sale Department." This paper is the "Tender Ad." medium of Canada and always brings bids from the reliable contractors and supply houses.

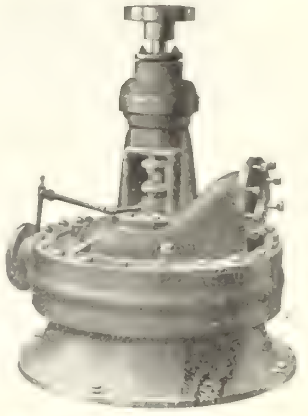
File your plans for any work you are inviting bids on, in our offices at Toronto, Montreal, Winnipeg or Vancouver.

Contract Record
Toronto Ontario

Vertical Turbine Pumps

It is frequently found necessary to locate a centrifugal pump in a pit below the floor level, in order to get within suction distance of the water supply. In cases of this kind the vertical centrifugal has been extensively used and has proved most satisfactory.

The pumps can be either belted or connected directly to vertical motors. The latter method makes an ideal pumping plant, as the motor can be located above ground where it is free from all moisture and can receive proper care. The design of the pump is such that it requires very little attention, and it is necessary for the attendant to go down into the pit only at long intervals.



4" Turbine Pump. Capacity 333 Imperial gallons or 400 U.S. gallons per minute. 94 Feet. 20 H.P. at 1,130 r.p.m.

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THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO. Limited

Sales Offices : MONTREAL TORONTO COBALT WINNIPEG CALGARY VANCOUVER

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¶ This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
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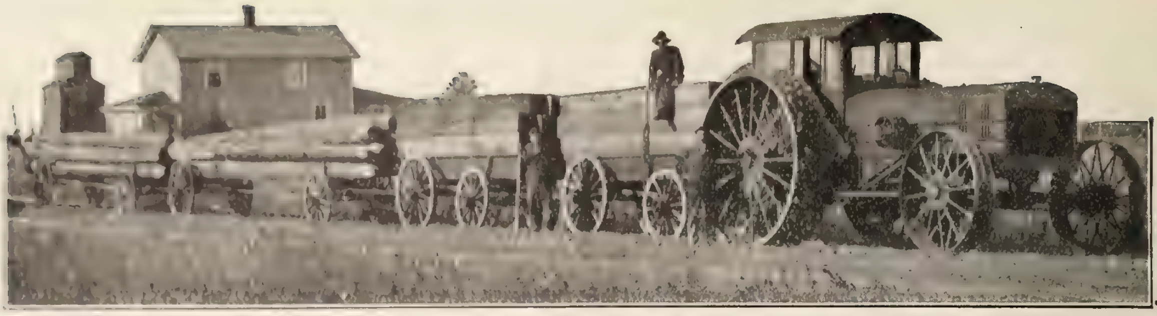

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"The Contractor's Ultimate Hauling Power"

Displaces Twenty Teams and a Troublesome Gang of Laborers.

The most powerful, durable tractor of the present day for hauling or road building work.

All roads and conditions look alike to the **Pioneer "30."** It has repeatedly proved itself to be cheaper and better than team haulage, not only on smooth surfaces and heavy grades, but for many freighting propositions where teams cannot be used.

The **Pioneer Tractor** is especially designed for heavy traction duty such as drawing cement, sand, coal, bridge timbers, bridge and structural steel, road graders and other road machinery.

Its three speeds forward make it possible to haul heavy loads for long distances with a lower consumption of gasoline than any other tractor made.

Mail the coupon for detailed description and further particulars.

The Pioneer Tractor Company, Limited

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CUT OUT, SIGN AND MAIL:

THE PIONEER TRACTOR COMPANY, Limited

Suites 201-202, Alberta Loan & Investment
Company Building, Calgary, Alta.

Kindly mail me detailed description and full particulars of your Pioneer Thirty.

My name is..

My P. O. is...

My Province is....................................
(And date)

C. R. & E. R. 5/29/12

Here's what the Owner says:

Midway, N.D.

The Pioneer Tractor Co., Ltd.,
Calgary, Alta.

Gentlemen: I am sending you a photograph of the outfit that we had on the hauling contract out of Hope, N.D. With the five Winona Wagons we were hauling an average load of 25 tons, consisting of sand, cement and coal. The distance is about 20 miles and we made the round trip easily in 12 hours, this included unloading. The road was very heavy, owing to the rainfall of October and November, and full of heavy grades, but your three speeds forward made it possible to haul a full load all the way—the low gear for the heavy grades, etc. The one speed tractors could have loaded only for the heaviest grade. I used about 60 gallons of gasoline per trip, 20 miles with load and return and made 32 trips without an accident of any kind—over 1,200 miles in 32 days.

Muir Brothers of Hunter, N.D., had two Pioneers on the job and they also are of the opinion that for a freighter proposition, **The Pioneer "30" has them all beaten seven ways from Sunday.**

Very truly yours,

E. R. LOOMIS.

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10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line **2,600 Lbs.**

On a Double Line will Lift **5,200 Lbs.**

160 Feet per Minute
80 Feet per Minute

Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

Weight with Boiler, 4,000 lbs; without Boiler, 2,400 lbs. Light enough to be moved about easily.

Length over all, 5 ft. Width over all, 5 ft. 10 in. This Engine is also made non-reversing, at a reduced price and weight. Made with One Drum or Two Drums.

Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

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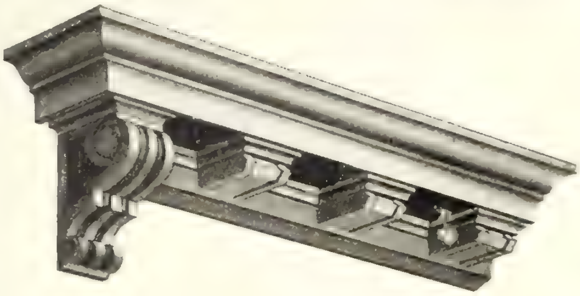

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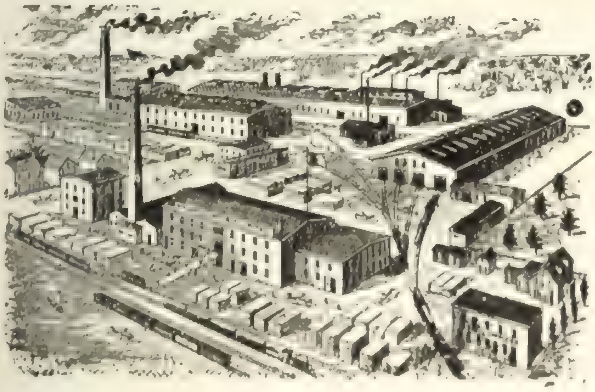

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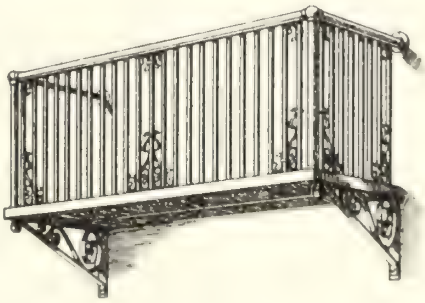

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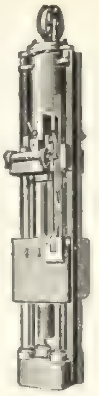
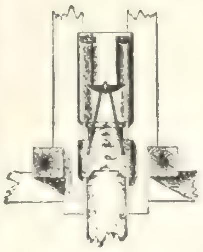


Steam Hammer



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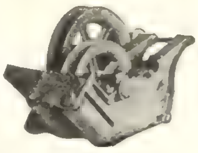
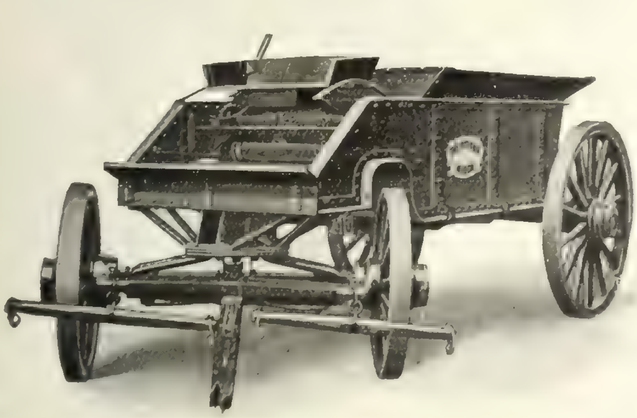
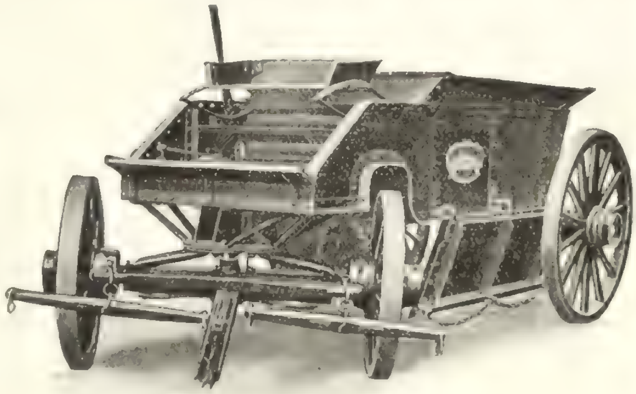


Perfect Head Block





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are the latest development in Dump Waggons, and the original cost is no higher than inferior makes.

Strong, light, everlasting, first cost is last cost.

Let us demonstrate the superiority of this Dump Waggon over all others.

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NO "HAND-TO-MOUTH" SUPPLY

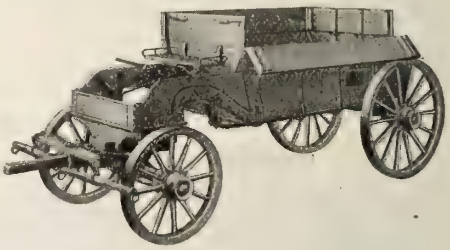
THE storage building shown here has 12,000 square feet of floor space. It is for hubs, spokes and rims *exclusively*. Think that over.

There is over a *year's* supply of seasoned stock right in that building. And we can build a tremendous lot of wagons in a year.

There is no hand-to-mouth supply of wheel stock at the Watson plant. This storage house is wide open to any visitor who wants to see it.

There are wagon makers who frequently use spokes right out of the car. You can get such wagons for less money than the Watson. You can also take your own chances on the wheels. Plenty of eight and ten year old Watson wheels are still running. When you see them, think of the Watson plant that is back of them.

We ship wagons promptly



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ALSO OFFICES IN
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When you are preparing your specifications and tender forms for your streets, boulevards or country roads be sure to make them wide enough to include

FINISHED DOLARWAY PAVEMENT

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For Park Roads, Boulevards, City Streets, Highways, Etc.

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Five to six inches of Portland Cement Concrete provided with the necessary expansion joints. The surface is then treated with our adhesive Dolarway Bitumen and with coarse sand or fine gravel or screenings. This seals the concrete, prevents cracking or chipping, and produces a wearing surface which is clean, noiseless, resilient and similar in appearance to other forms of bituminous pavement. It does not bleed in hot weather, neither does it become brittle or peel in the cold. It is a well-known fact that moisture causes concrete to expand and contract 5 times as much as a change in temperature. Our seal coat keeps out this moisture, thereby preventing the cracking and chipping which would otherwise occur.

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The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800yds. two inch top; or 4000 yds. one-inch binder in ten hours.

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Dredges, Ditchers, Derricks,

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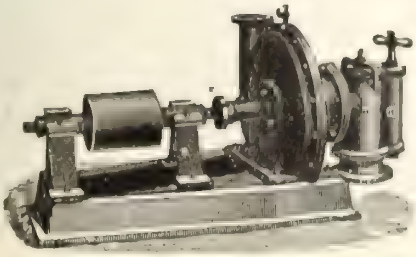

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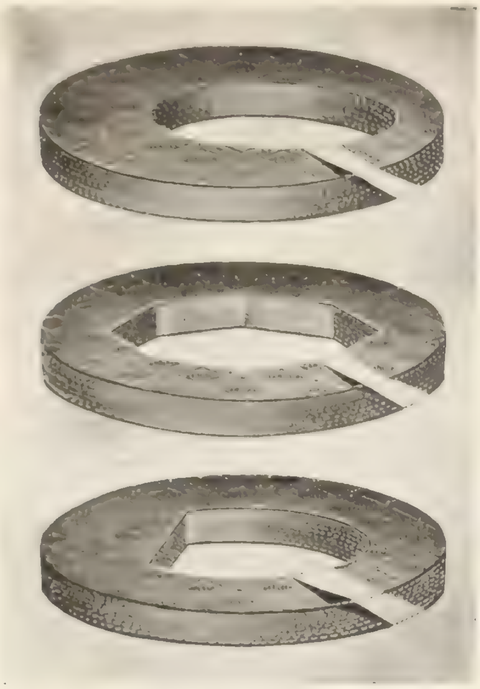

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We make a specialty of Steam Hose, Air Hose, Water Hose, Suction Hose, and Dredging Sleeves.

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PIONEERS IN THE PACKING BUSINESS

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Stock Doors

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THESE are some of our Stock Designs. We carry a stock of from six to ten thousand and can ship any quantity of stock sizes, grades and styles immediately.

We call your attention specially to Door No. D 100 in No. 2 grade. It is practically clear. In many cases they run clear. Our grades all through are much above the standard.

We solicit a trial order for we are sure if you once use our doors it will mean a continuance of you handling them,

If there is any other style of Door you require, let us have your list and we will be pleased to quote you. We are in a position to get them out in short notice.

Write for Catalogue ***Prompt Shipments***

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Be Prepared

for any Contract that may come along, being sure that all your Equipment is RELIABLE.

WE MANUFACTURE

Dump Cars, Axles Wheels, Etc.

and our products have given general satisfaction.

Write for references.
Enquiries and correspondence respectfully solicited.

The Smith Foundry Co.
LIMITED
Manufacturers of Contractors' Needs of Every Kind.
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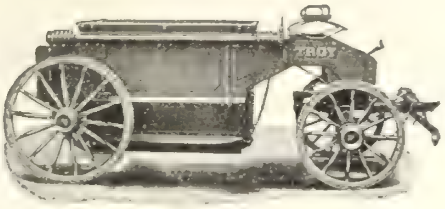
On That Draft Proposition



Long or short coupled? When you say a long coupled wagon pulls as easy as one coupled a foot shorter, you get a laugh from every man who ever drove a team. This close-axled TROY *does* pull easier than any other wagon. It *doesn't* stall on the dump. It's loads *are* full measure.

Isn't it the wagon for you? Get Catalog 2Z and the price.

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Troy Wagon Works Co.
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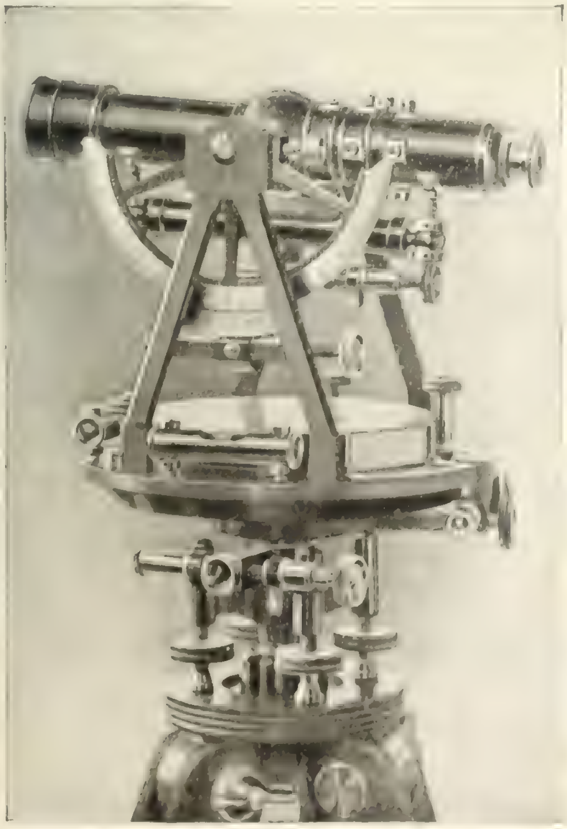
Canadian Distributors:
Baines & Peckover, Toronto; N. J. Dinnen & Co., Winnipeg; Vancouver Carriage Co., Vancouver; Canadian Equipment & Supply Co., Ltd., Calgary; J. H. Anderson & Co., Montreal.



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Take Advantage of Compressed Air Economy

BY USING AN

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Portable Gasoline Engine Driven

AIR COMPRESSOR OUTFIT

If you have any rock excavation for foundations, trench work, or any riveting, caulking, etc. to do you will find an Abenaque Outfit can be used with ultimate economy, and to better advantage than either hand or steam driven tools. Write for catalog "M."

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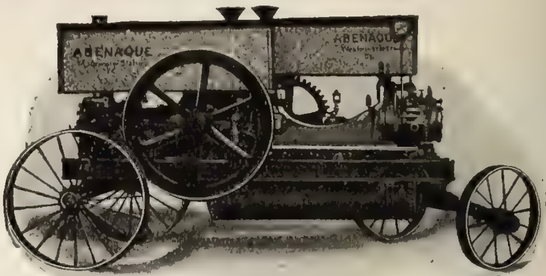

TRENCHING MACHINES

This year, labor is going to be scarce and very expensive. The amount of municipal work is going to be large and unless the Contractor uses the proper machine he will be behind time. If he gets one of our "Trenching Machines," which can make a cut all the way from 27 in. to 60 in. wide and any depth down to 20 ft., he will be sure to fulfil his engagements and save a big percentage of money.

For further information, apply to

J. W. HARRIS MANUFACTURING CO.
LIMITED
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The Dahlstrom Products

A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.

Dahlstrom Metallic Door Co.

The Dahlstrom Products

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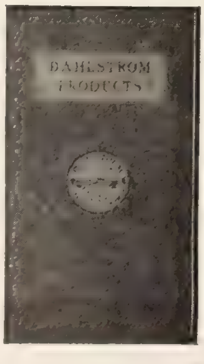

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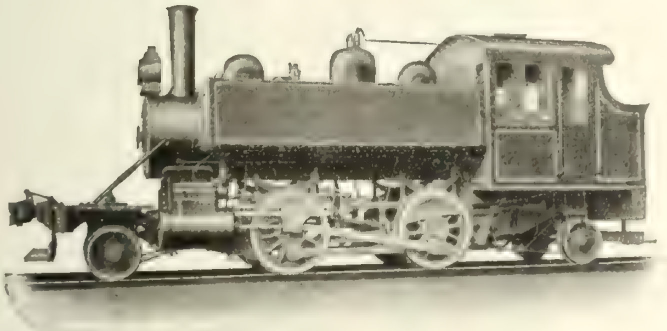

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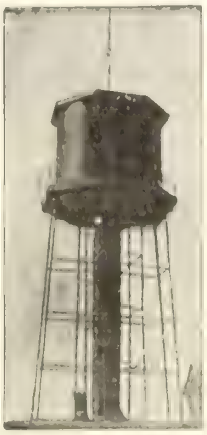

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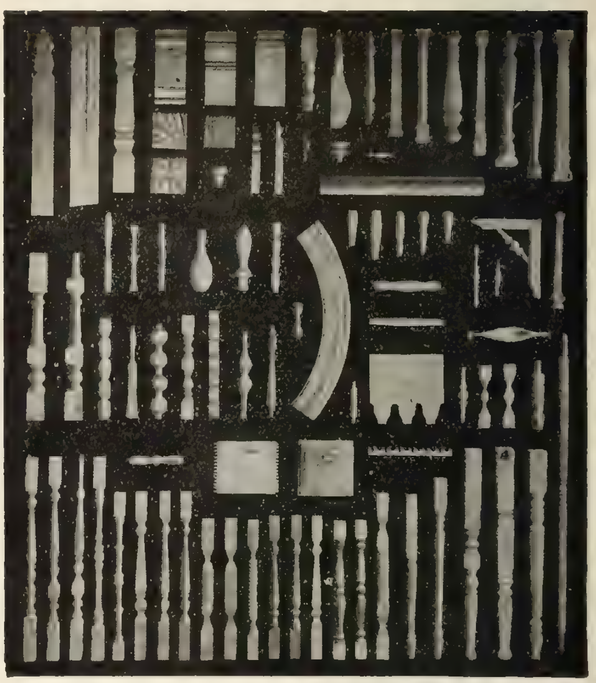

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No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

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Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 and 30 per cent. for approved specifications:—

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.05	$4.40
40	3.25	4.75
50	3.65	5.55
60	3.90	6.00
70	4.15	6.50
80	4.65	7.00
85	5.10	7.85
90		9.10
95		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
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Standard compression work, 60 and 5 per cent.
High grade compression work, 56 and 5 per cent.
Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 basin cocks, 70 per cent.
Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock	net $1.85
No. 4½ Fuller's	net $2.35

Square head brass cocks, 60 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00.

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16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

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Lead pipe, 20 per cent. off; lead waste, 20 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)		Black.			Galvanized
¼ inch	....	$1.87	¼ inch	....	$2.70
⅜ "	....	1.87	⅜ "	2.70	2.57
½ "	2.47	2.35	½ "	3.40	3.23
¾ "	2.88	2.75	¾ "	4.03	3.83
1 "	4.13	3.93	1 "	5.78	5.48
1¼ "	5.63	5.35	1¼ "	7.88	7.49
1½ "	6.75	6.44	1½ "	9.45	8.98
2 "	8.46	8.05	2 "	12.06	11.46
2½ "	13.51	12.85	2½ "	19.26	18.30
3 "	17.74	16.86	3 "	25.29	24.03

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.
7 and 8-inch pipe, 50 per cent.
Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.
Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.
Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.45.
Binder stone, $1.30 per ton, f.o.b. Toronto.
Burnt River rubble stone delivered, $15 to $16 per toise.
Free stone delivered, $15 to $16 per toise.
Brown coursing stone, delivered, $3.25 to $3.50 per yard.
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Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.
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Lime, per cwt., delivered, not less than 1,500 lbs., 38 cents.
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Pure White Lead, ground in oil, $7.25 per 100 lbs.
Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.
Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.
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Raw Linseed Oil, in barrels, 98c. per gallon of 9 lbs.
Turpentine, in barrels, 70c. per gallon.
Pure Red Lead, dry, $6 to $7 per 100 lbs.

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Crawfords Limited have been incorporated with a capital of $100,000 to deal in hardware, boots and shoes, timber, lumber and building materials, with head office at Tilbury, Ont. The provisional directors are W. C. Crawford, W. W. Jackson and R. W. Hees, all of Tilbury.

National Equipment Company, Limited, has been incorporated with a capital of $100,000 to carry on a general contracting business with head office at Toronto. The provisional directors are J. C. M. MacBeth, F. W. Scott and J. A. Macintosh, all of Toronto.

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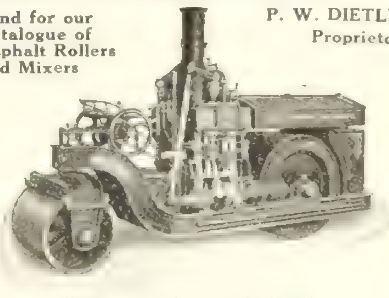

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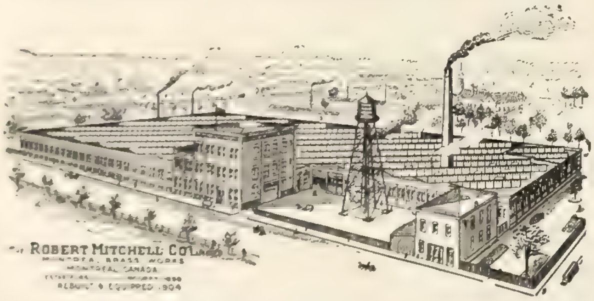

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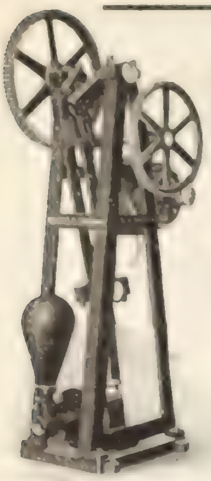

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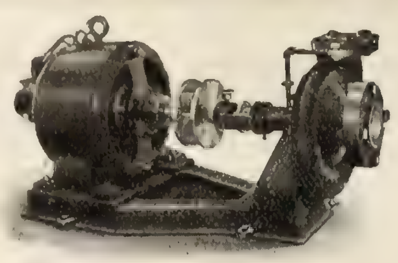

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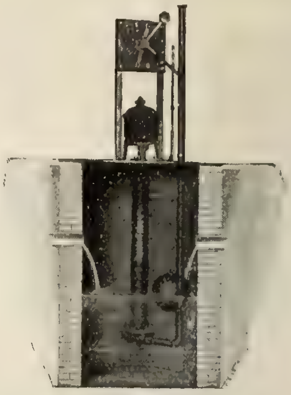

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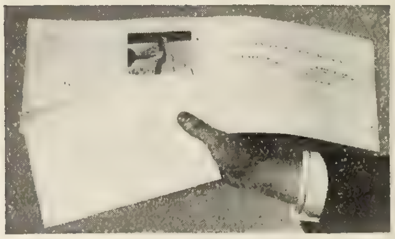

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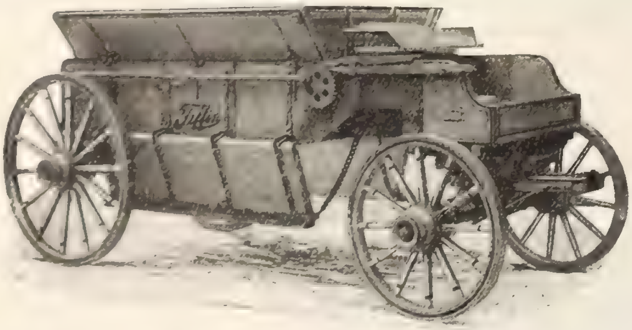

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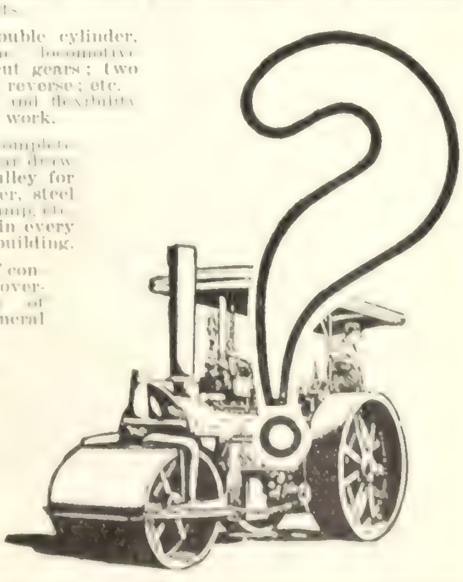

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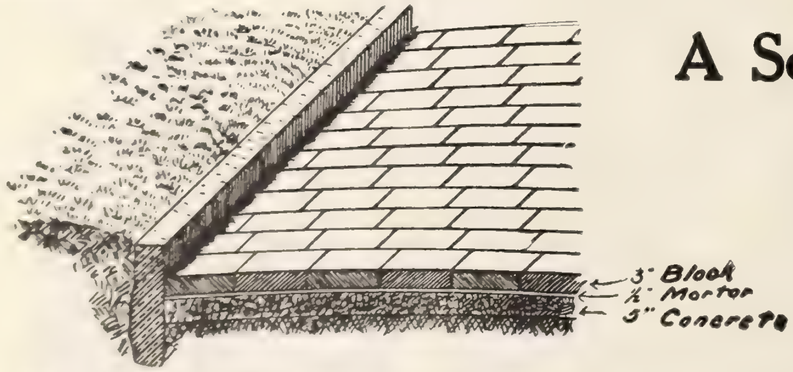

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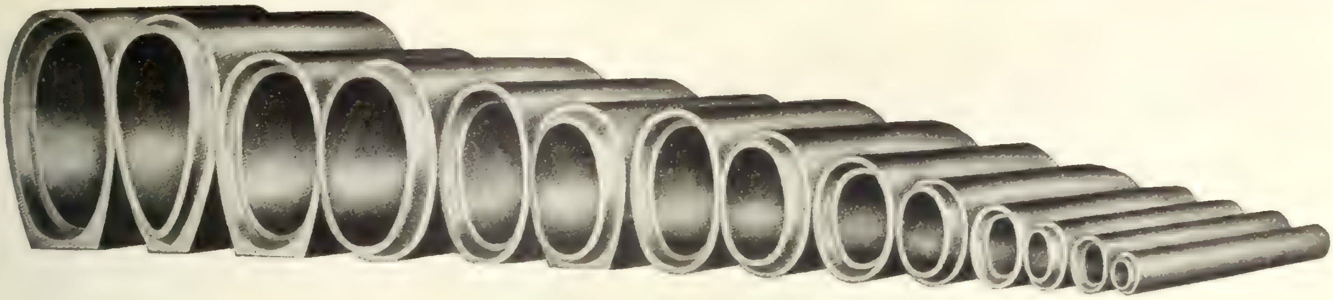

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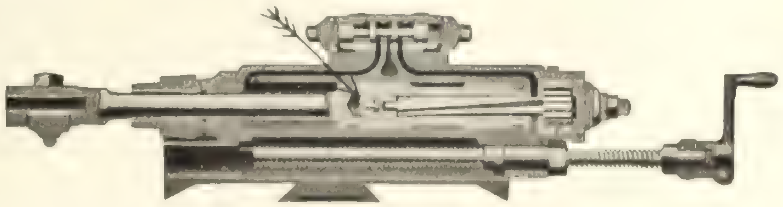

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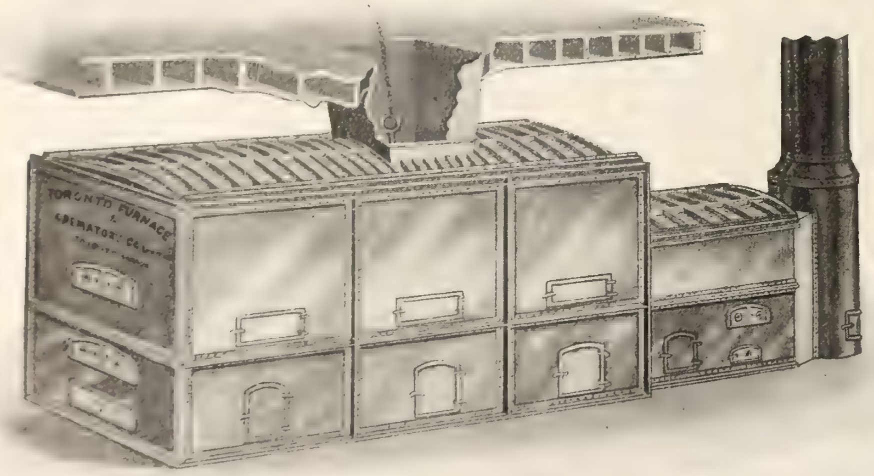

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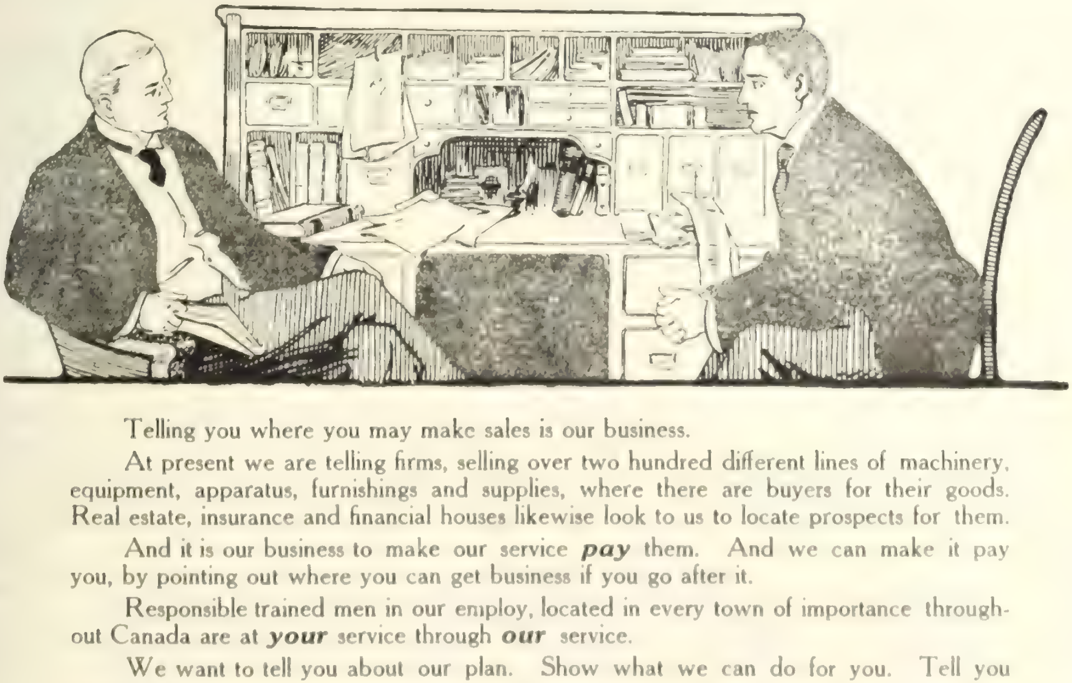

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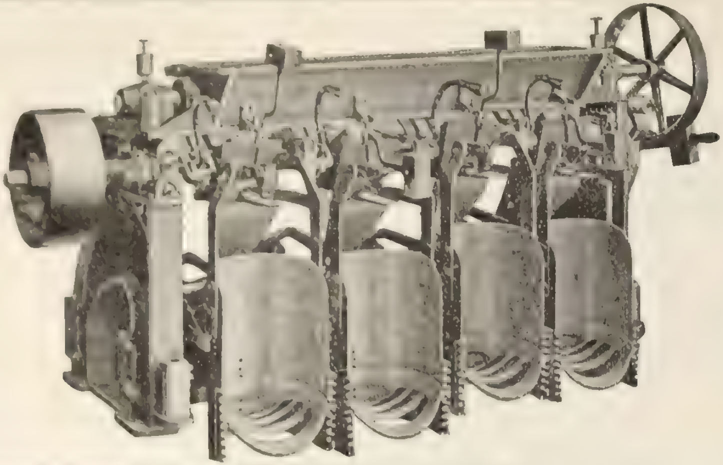

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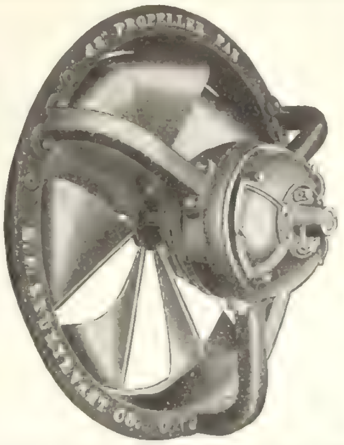

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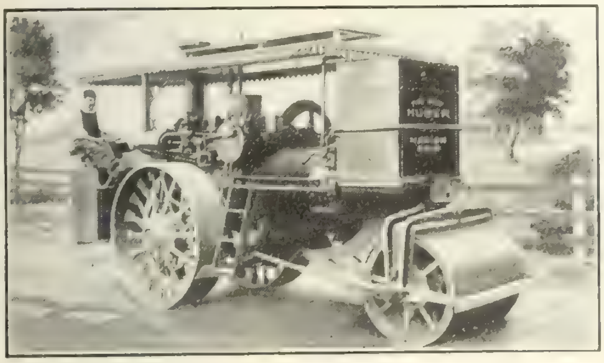

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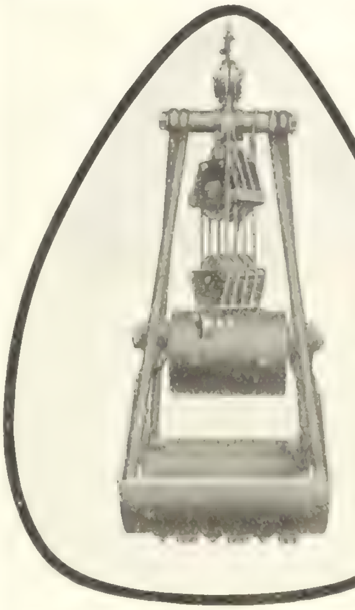

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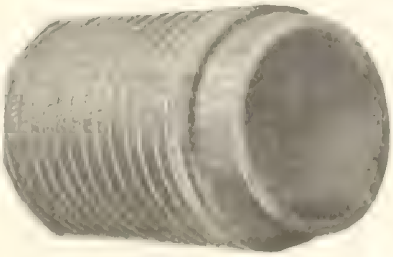

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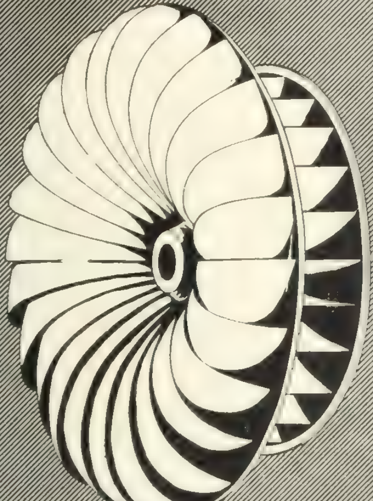

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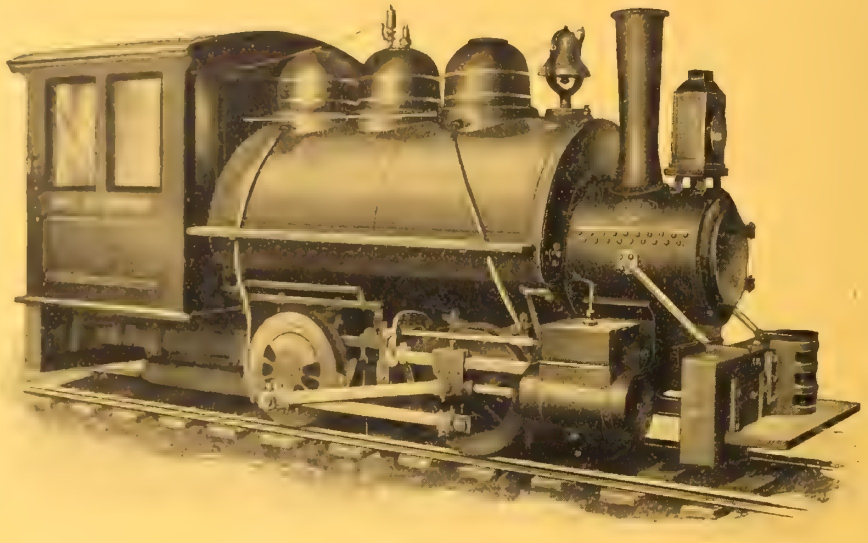

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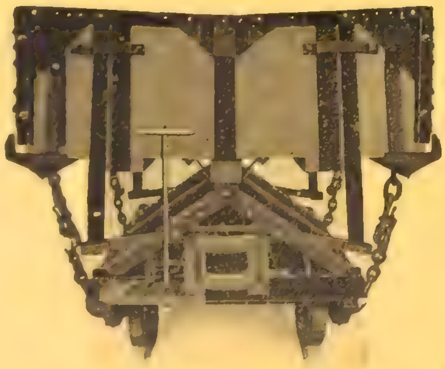

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Contract Record and Engineering Review

Triplex Power Pumps, Vacuum Pumps, Centrifugal Pumps, Steam Pumps, Condensers

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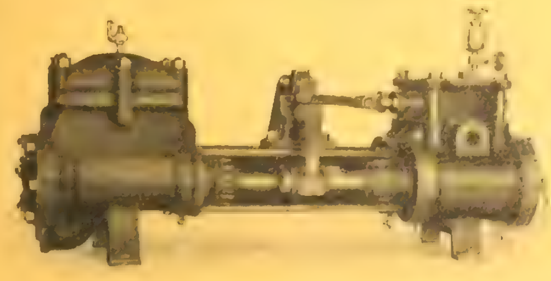

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Made in all Kinds of Glass on Short Notice

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have gained their reputation for

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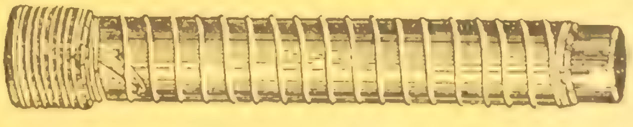

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Classified Directory to Advertisements, Page 6

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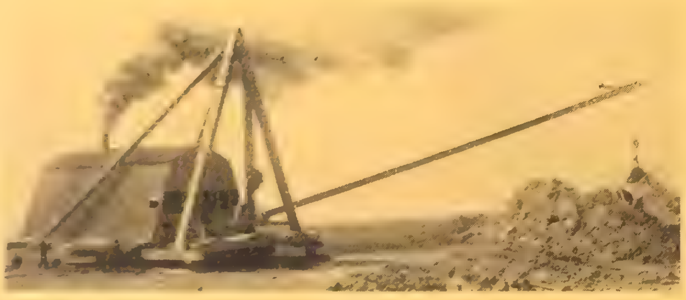

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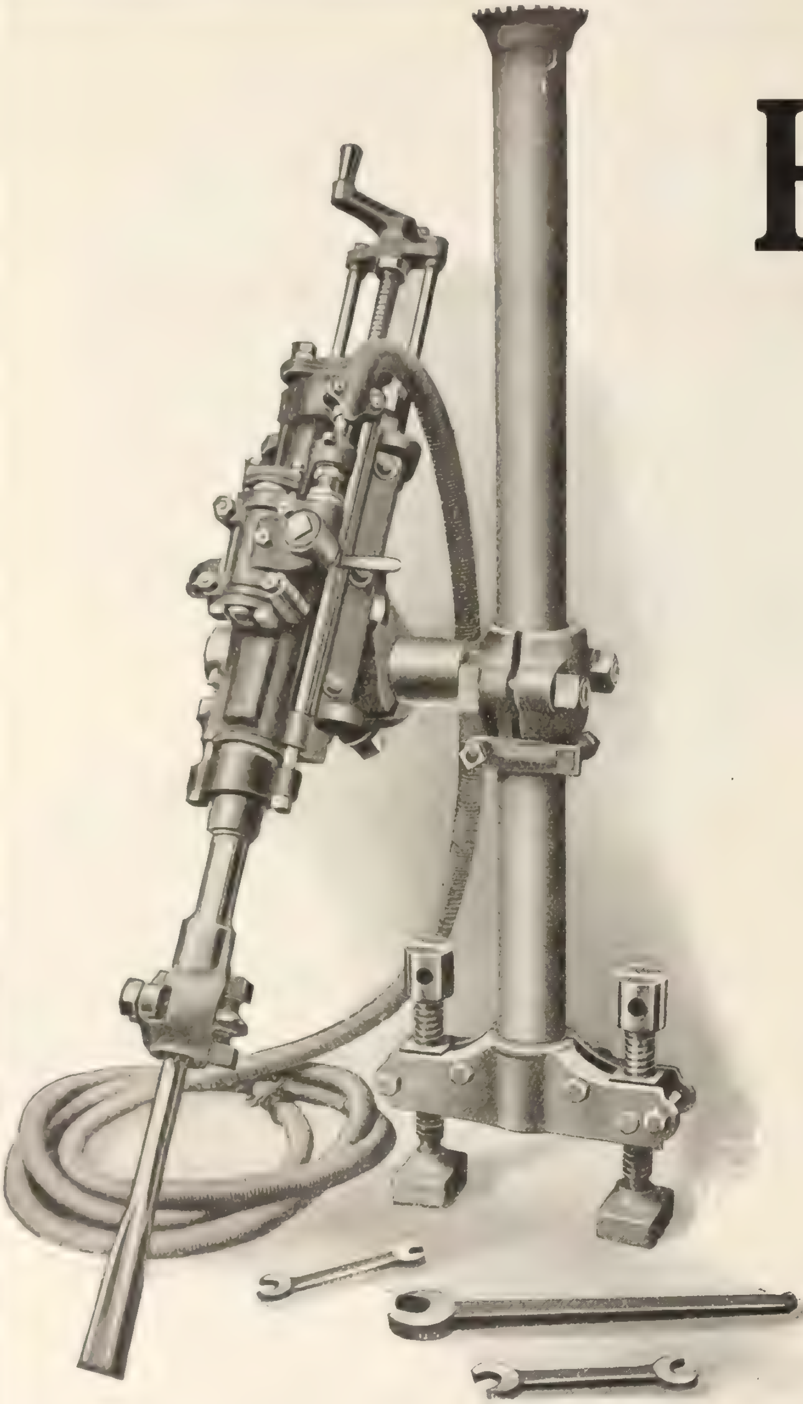

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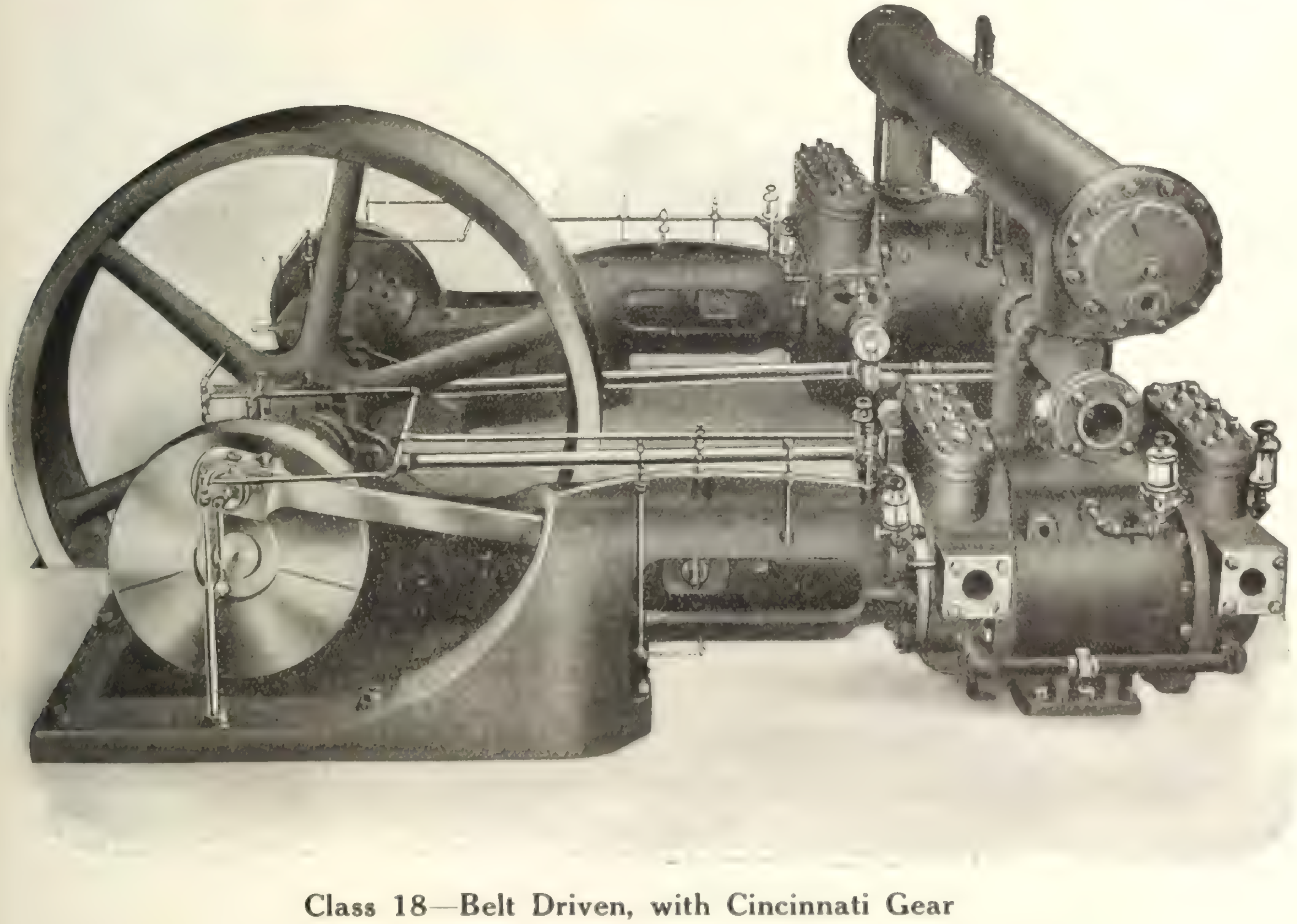

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[illegible] Levels
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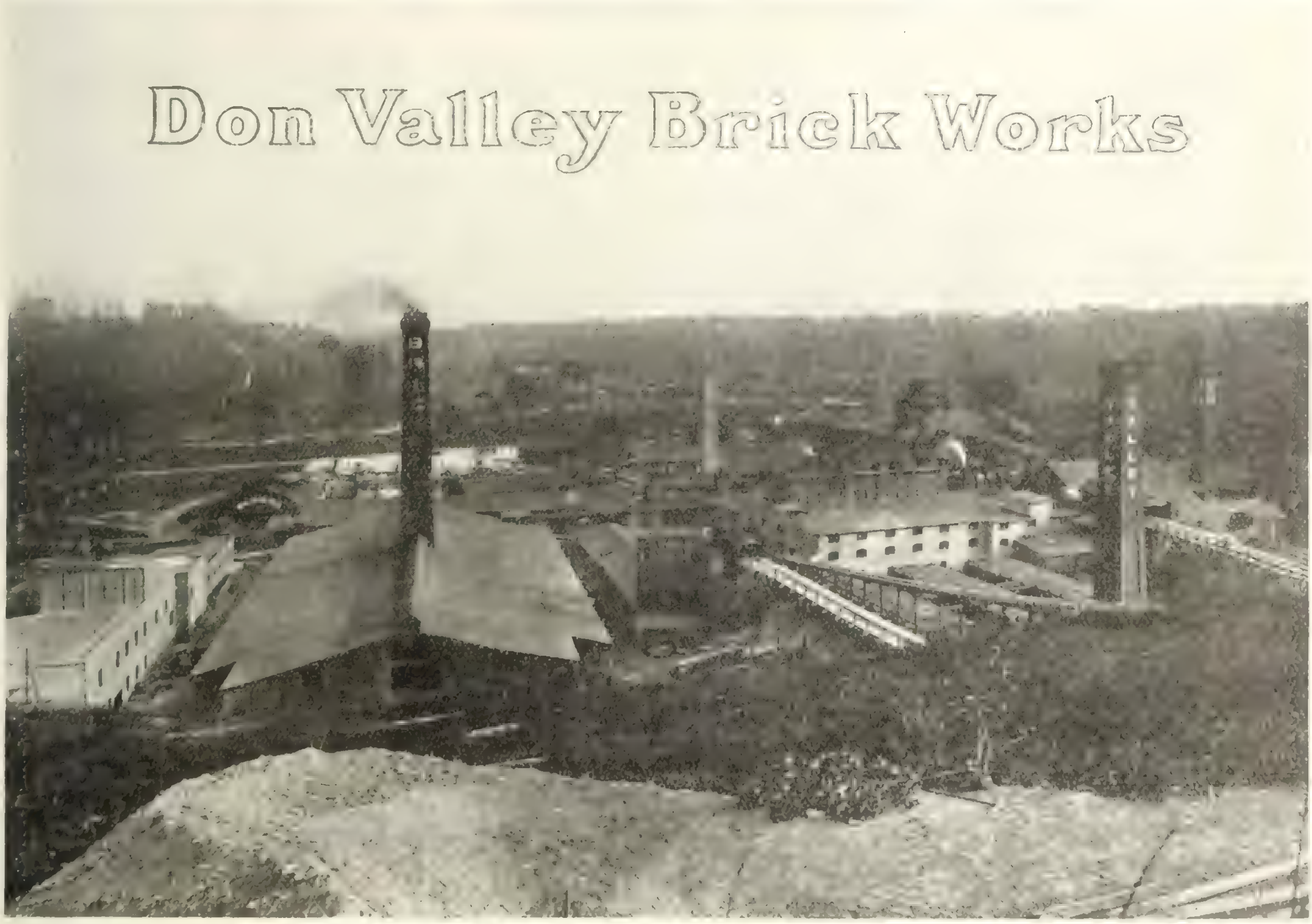

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The factor which often determines the value of a brick for structural purposes is its cheapness, but there are three considerations which are of infinitely greater importance, viz., durability, strength and beauty.

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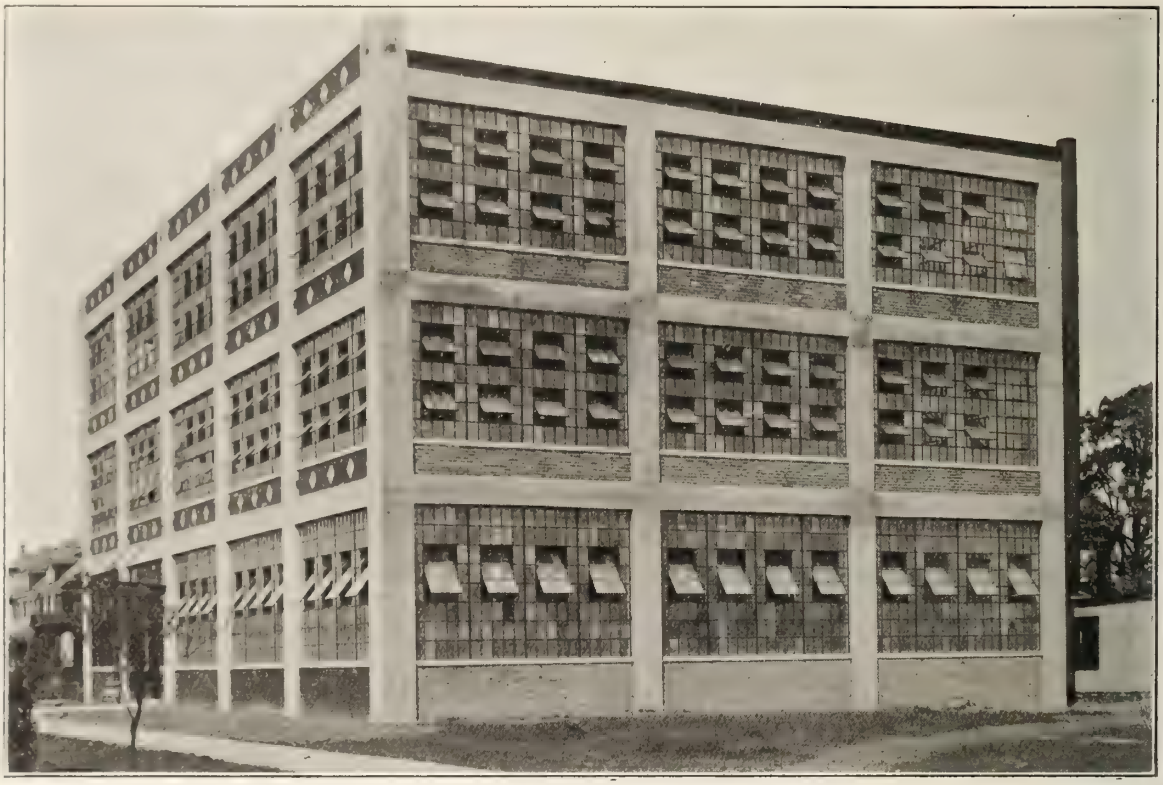

One of the many buildings in Canada equipped throughout with **"Fenestra"** Solid Steel Windows.

Is first cost in your Window Sash everything?

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See to it that your architect gives you clear, positive facts and figures on sash upkeep.

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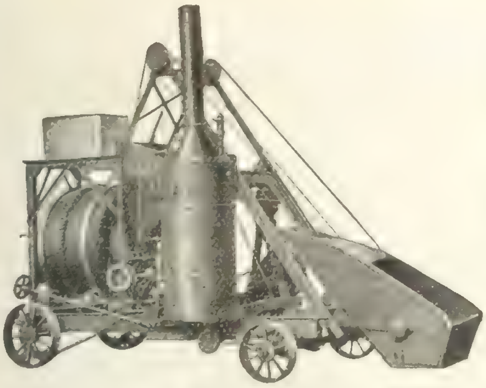
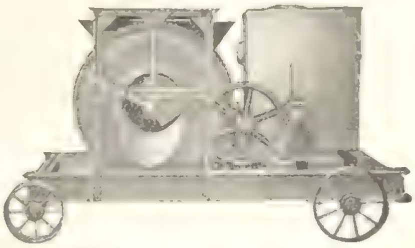


London Paving Machine with front loader

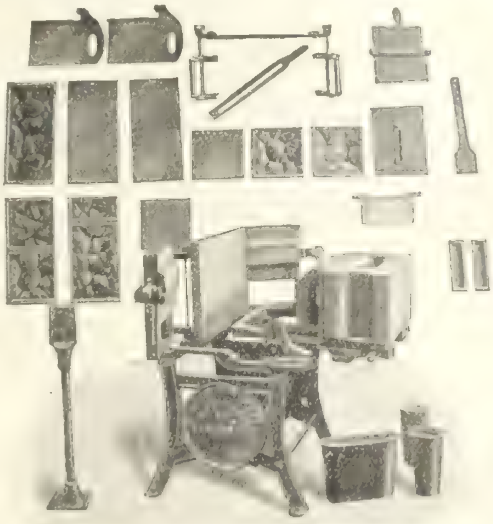
London Concrete Machinery is built up to a standard.



London Standard Batch Mixer with Charging Bin, Gasoline Power

CONTRACTORS—It is worth something to you to know that when you use the LONDON MACHINES you have an equipment which is not a back number.

All OUR MACHINES are built by up-to-date METHODS and by the MANY NEW and IMPROVED FEATURES of the LONDON MACHINES place them in A CLASS by themselves.



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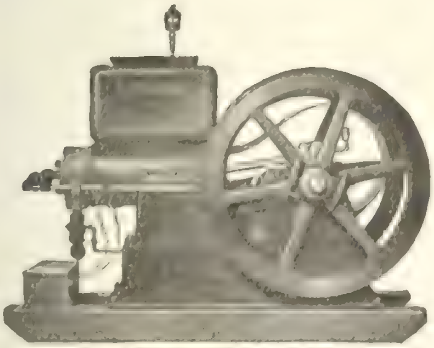
We are saving the Contractor money in the COST OF MACHINE, COST OF OPERATING, COST OF MAINTENANCE, everything made in our own shops. We sell direct to the contractor.

We are the only large Canadian Firm who specialize on Concrete Machinery.



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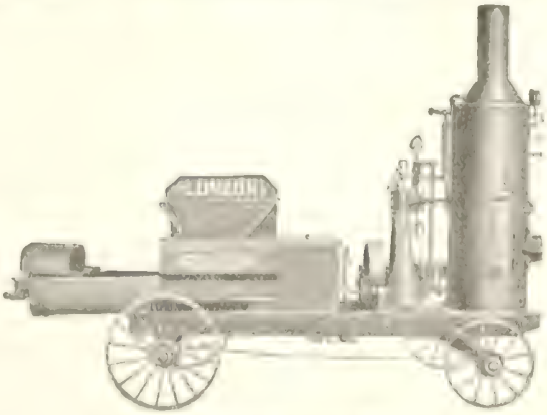

London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

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Toronto Office: N.E. Cor. Richmond & Bay Sts.

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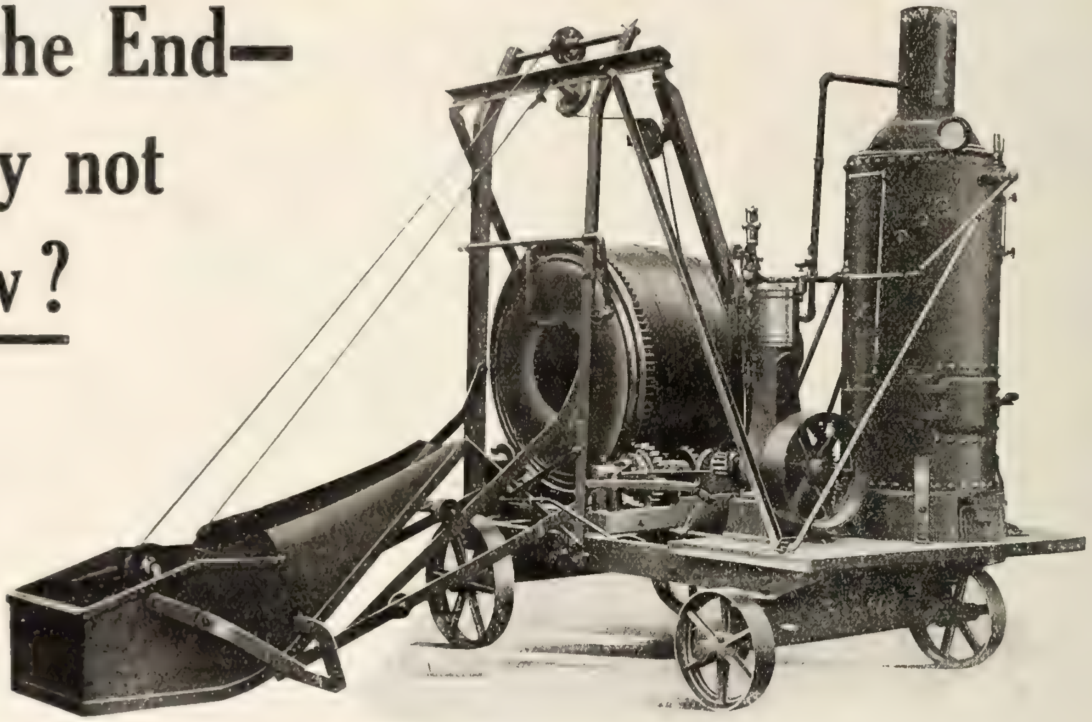
We are the Largest Manufacturers of Concrete Machinery in Canada

It will Mean a "Wettlaufer Heartshape" In the End—Why not Now?



The Time to Save Money on a Concrete Mixer is NOT WHEN You Buy---BUT AFTER

Prices on "Wettlaufer Heartshape" Mixers will compare very favorably with any mixer on the market. To the enormous advantages to be gained by using a "Wettlaufer Heartshape", add the saving of time and money for every days' work it does--there is your reason for investigating the merits of this Mixer. There is no flimsiness either in our selling talk or in the machine. Our arguments are hard facts—we can prove every one. The selling points are right there on the Mixer—you can see them for yourself.

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Automatic controlled. One man operates the entire machine.

Quick Work

each revolution of the HEARTSHAPE DRUM turns the batch end for end thus ensuring a quick and positive mix.

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All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

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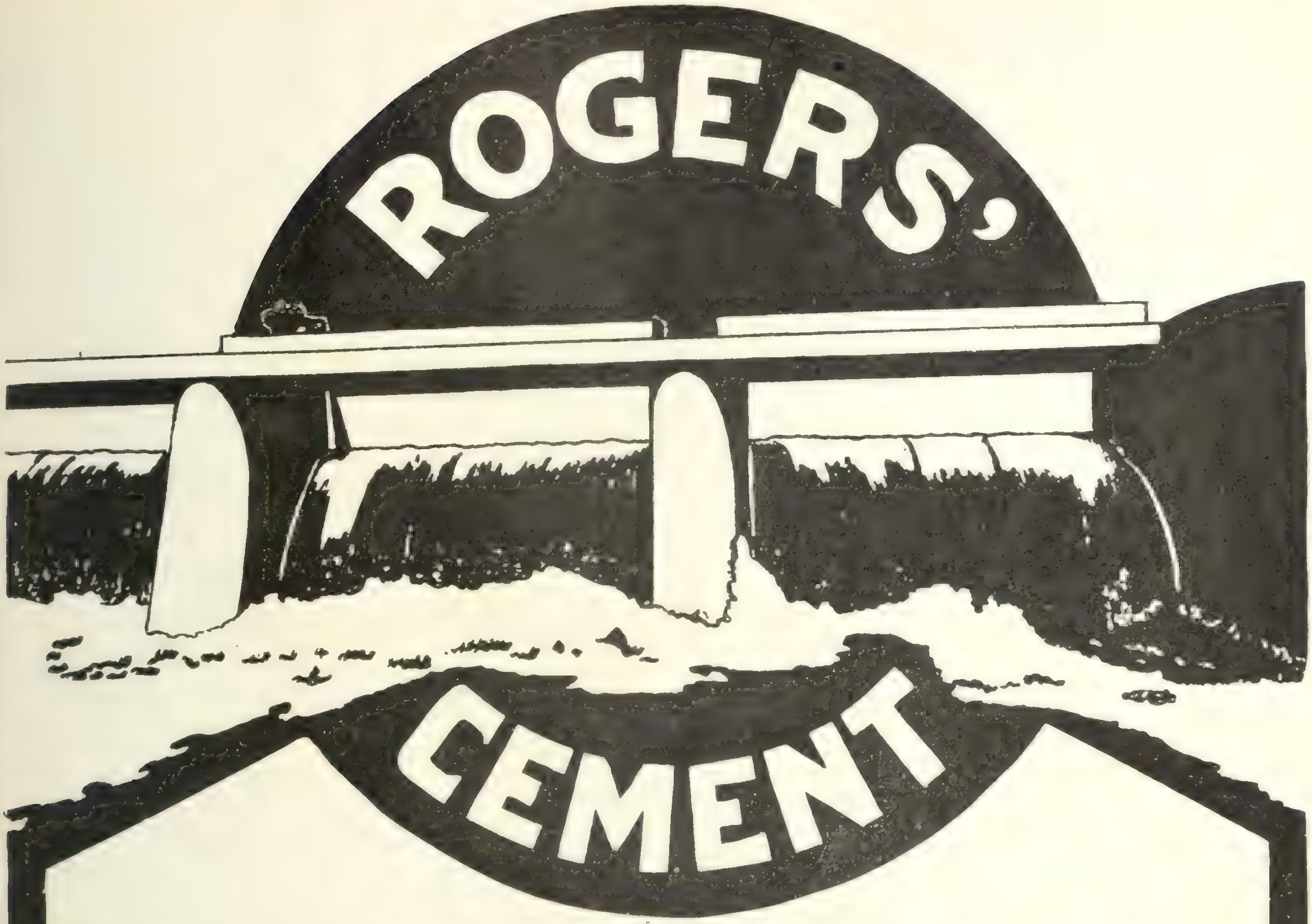

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The large reserve stocks enable construction projects to be carried out steadily, and as rapidly as the work will allow, with minimum delays in securing forms, and completing the work.

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Our mills are located at Atwood, Hanover, Kirkfield, Orangeville, Owen Sound, St. Marys and Wiarton

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For Sidewalk, Concrete Road and other contracts

WE can furnish crushed stone in all sizes, clean and free from dust, dirt and mold, and evenly graded.

We can guarantee delivery in any quantity. Write, phone or wire your orders.

Plants at Dundas and Vinemount

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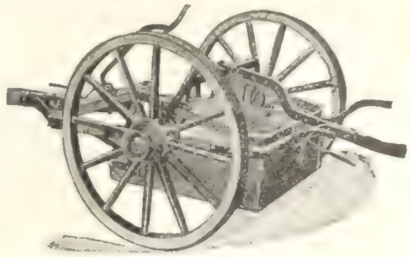

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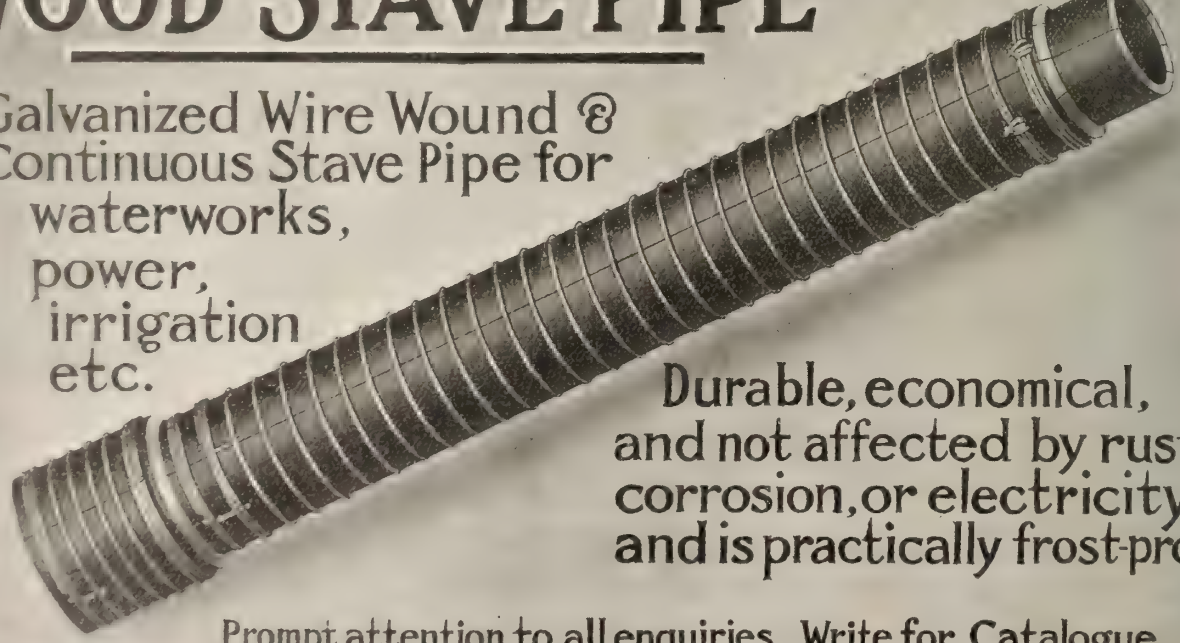

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Barrett Specification type of Roofs	1,490,523 sq. feet
Plastic Roofings	14,714 sq. feet
Slate Roofings	21,640 sq. feet
Tile Roofings	5,619 sq. feet
Ready Roofings	38,381 sq. feet
Copper Roofings	6,355 sq. feet
All other kinds	7,448 sq. feet

It is important to remember that while all these buildings were constructed by the Turner Construction Company, the specifications were drawn by a large number of architects and engineers. That the great majority of these specified a Barrett Specification type of roof, emphasizes the fact that whenever this roof is practical the best modern engineering practice will have no other kind.

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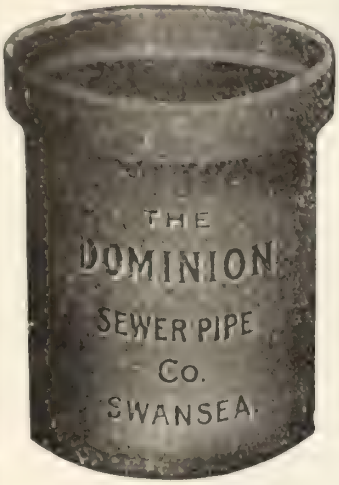

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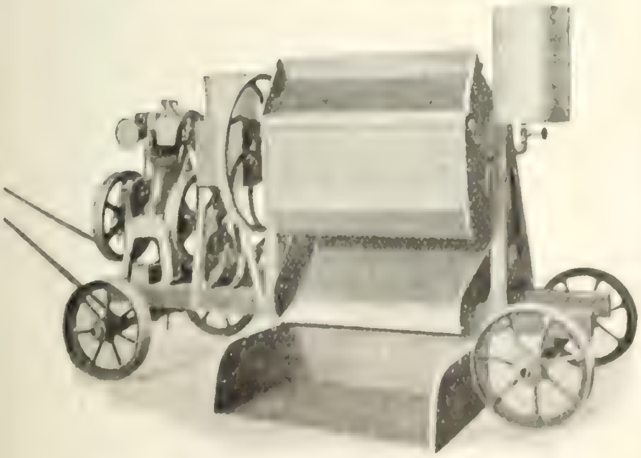

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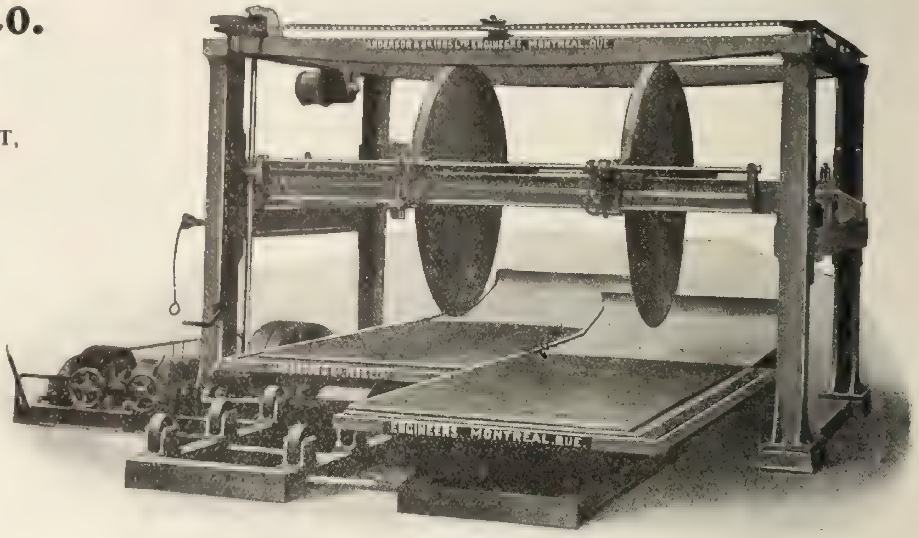

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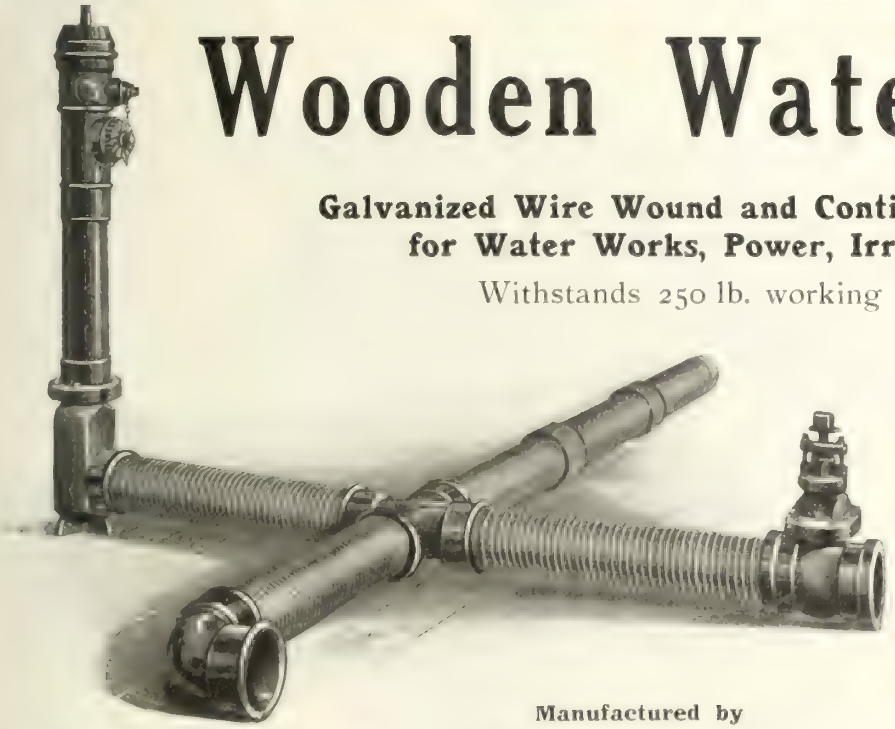

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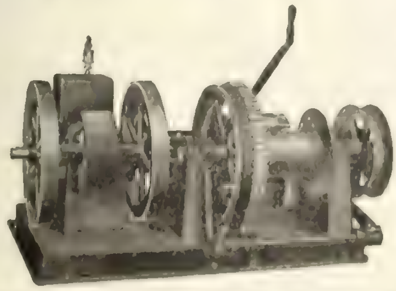

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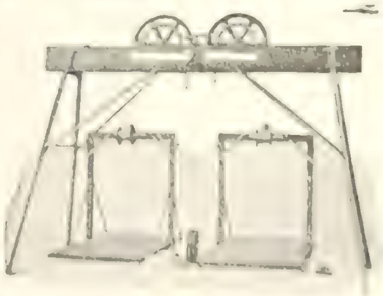

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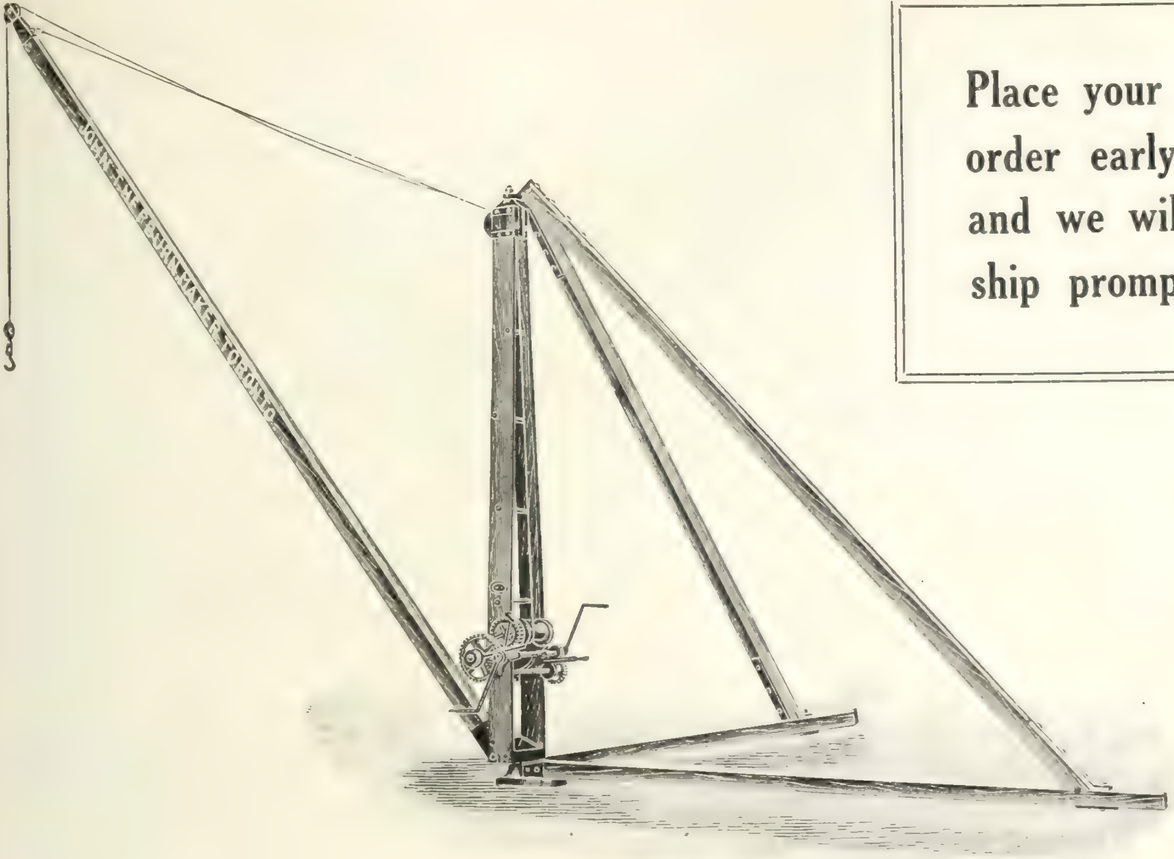
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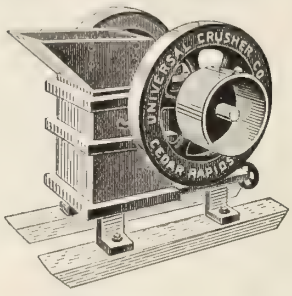

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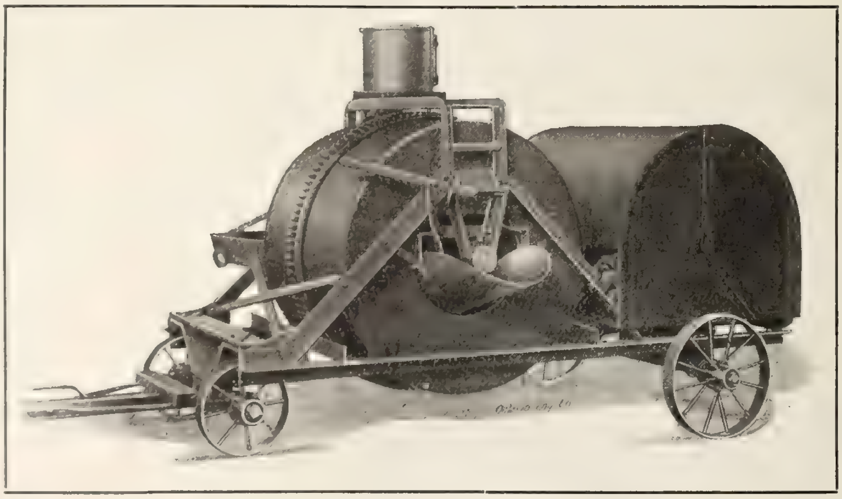

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A complete line of quarrying machines and Supplies

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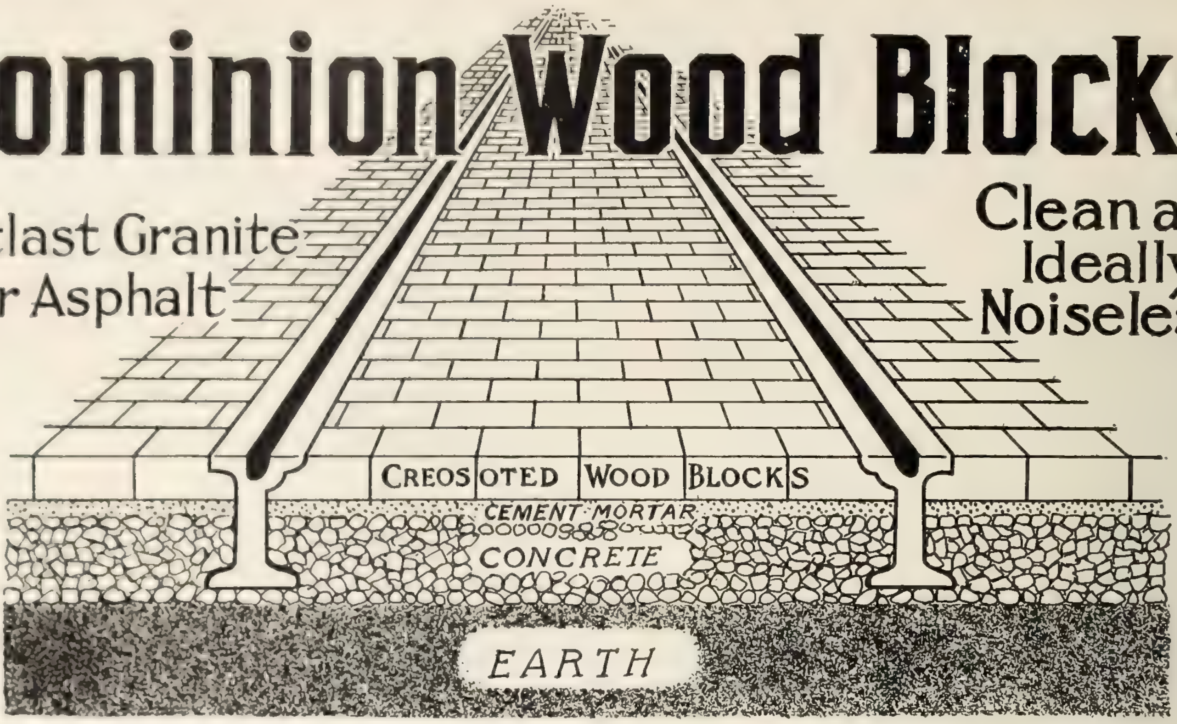

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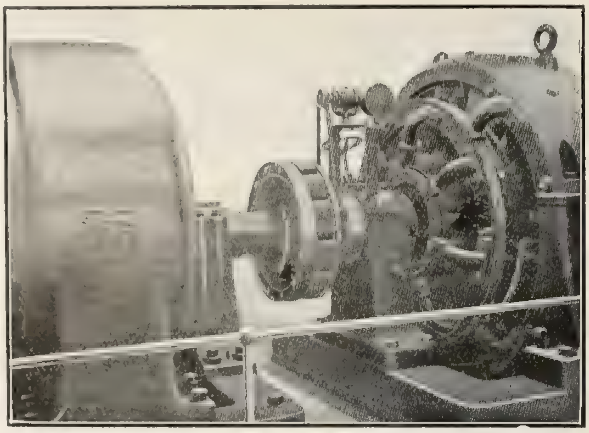

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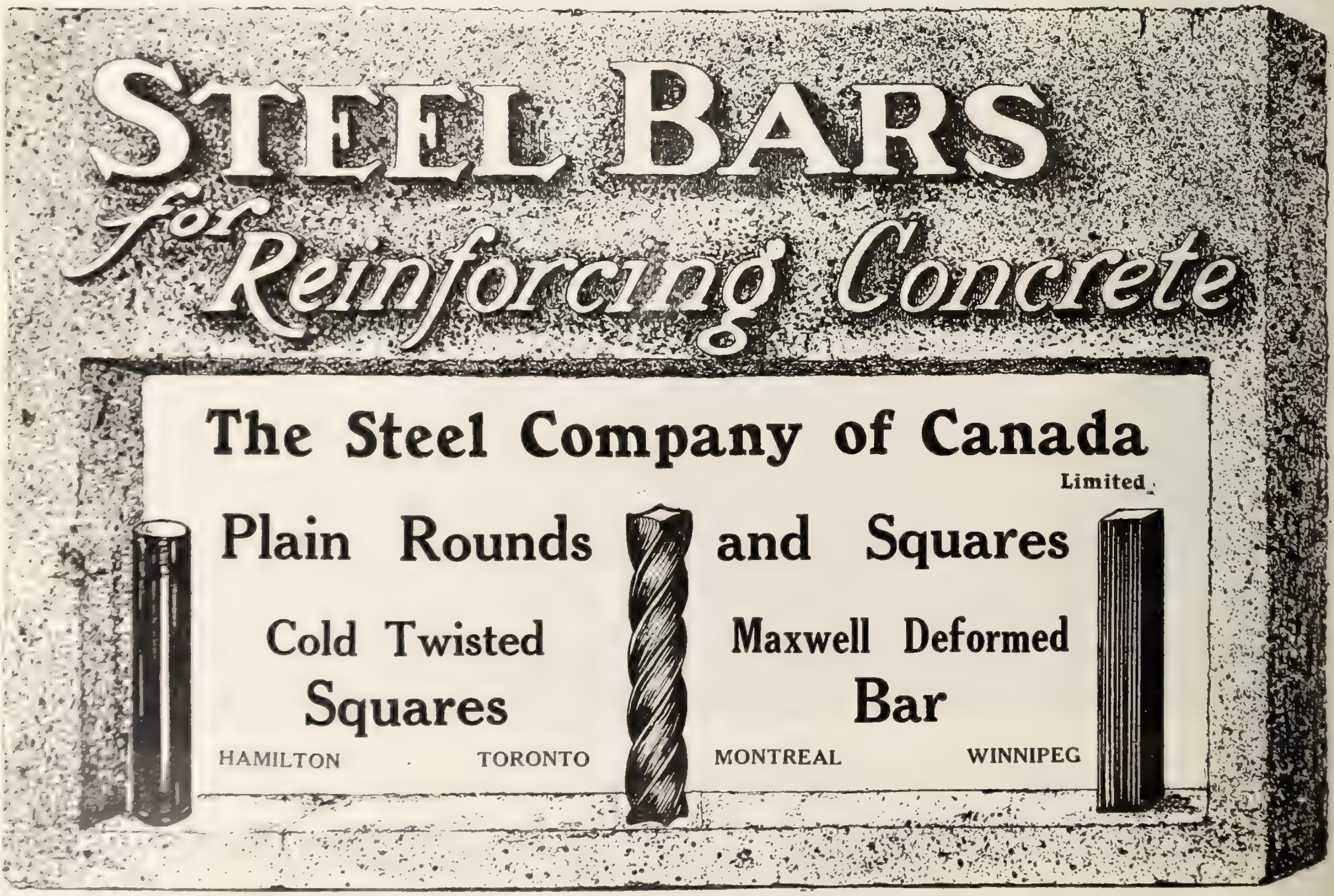

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The general use of the Thew Shovel in road building and street grading is conclusive proof that it is adapted to the conditions, economical for the purpose and efficient in operation. The following list of some of the contractors, in the State of New York alone, who have used and are using The Thew No. O Full Circle Swing Shovel in this class of excavation will indicate the popularity of the machine and its undisputed merit for such work :

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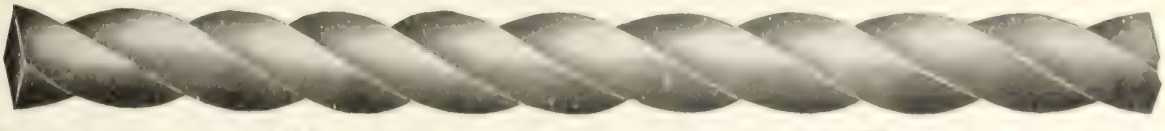
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.



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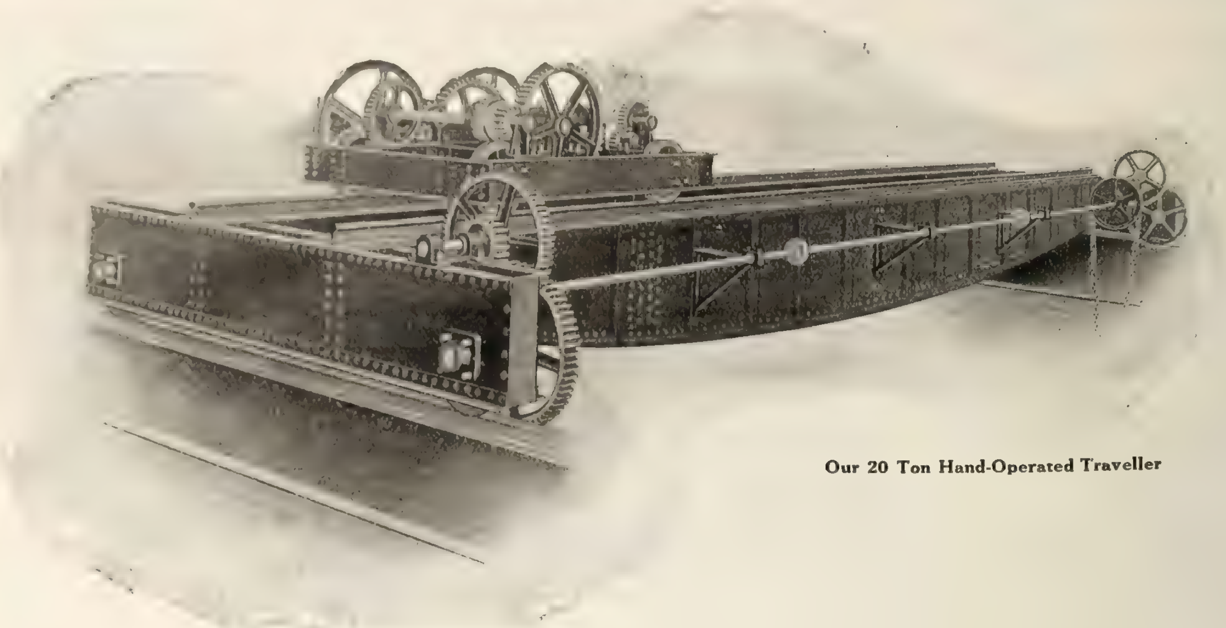

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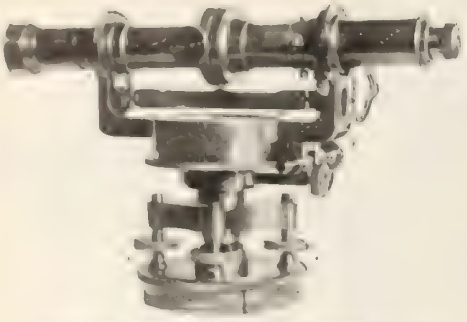

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Traversing and centering movement to lower plate. Very long inner centres. Most rigid and permanent in adjustment, and tested for extreme accuracy.

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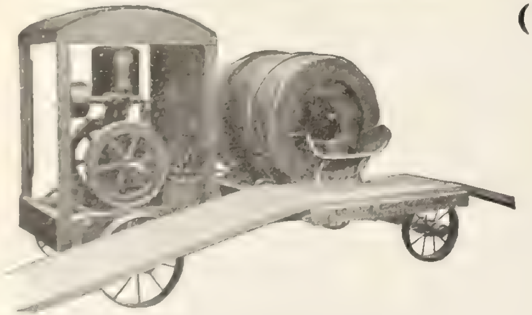

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Are Valuable Assets to Any Contractor

Simplicity in construction and operation make in "THE STANDARD" machine so little opportunity for wear that the owner, although he may have used the mixer for several years, can readily dispose of it at almost first cost.

This is easily accomplished because "THE STANDARD" Low Charging Mixer is moderate priced to begin with, the purchaser not being required to buy complicated, unnecessary and expensive charging mechanism and other devices, but the mixer drum only, simply connected and driven by the necessary power.

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The simple method of operating "THE STANDARD" Mixer, the large output of high grade concrete secured, the low first cost and low operating cost, secure ready sale of the outfit to local contractors in any section.

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The simple fact that the entire batch is in plain view of all, while it is being so thoroughly mixed inside the drum, is not only interesting to everyone, but thoroughly convincing of the high quality of concrete produced.

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Goodyear Suction Hose never caves in. It is built by a process that makes this impossible no matter how long the hose has been in use. It is built around a heavy steel spiral wire imbedded in the inner tube. Tube can't separate from wire nor can dampness reach it. Hence, rust and rot, one of the common failings of other makes of suction hose, is ***done away with.***

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Send at once for our catalog. If you are in doubt as to what kind of hose you need, let our expert help you solve your problem. **Our sales of the last four months 50% greater than those of last year. Defective goods returned only $23.93.** Write us to-night.

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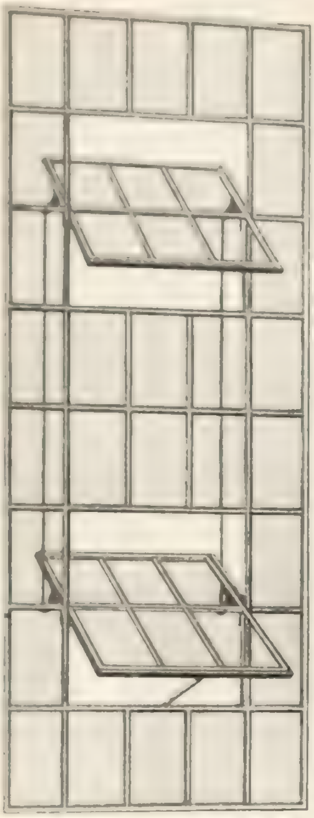

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Further, the distance between muntins is accurately maintained so that you can use standard glass without cutting at the building.

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Buckets are positively self-cleaning and cannot clog. Tractions are of the multipedal or rolling platform type and cannot mire. Digs tile ditches, sewer trenches, and field ditches with sloping sides.

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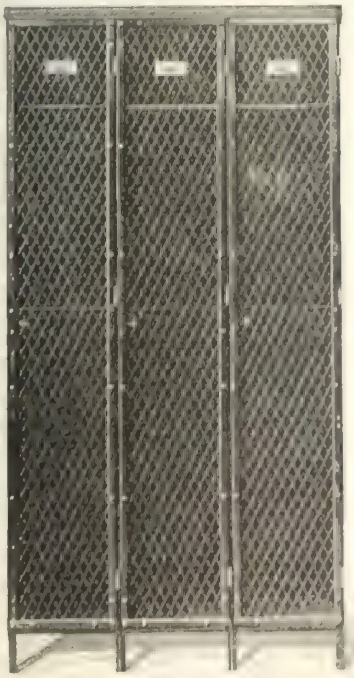

Make friends because of their substantial construction and unique features. We make several styles and sizes of these lockers. We'll know what you want if you just hint at your requirements.

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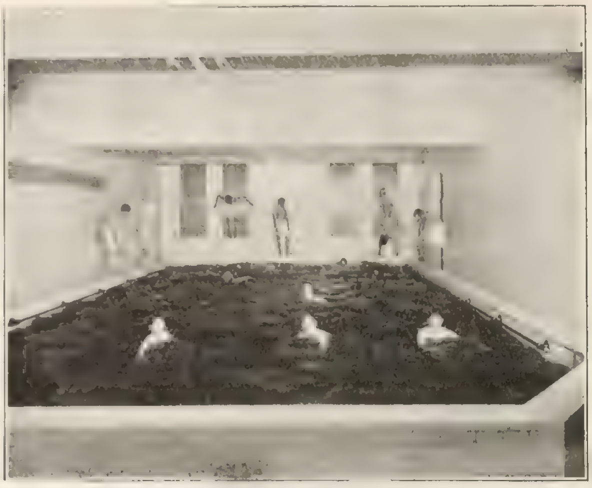
Twin City Sand Co., Port Arthur, Ont., says:

"We put 500 pounds of Medusa Waterproofing in this pool and it is giving the best of satisfaction. We cannot recommend it too strongly for any such work."



Swimming Pool Y. M. C. A. Building, Port Arthur, Ont.

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THE Ideal STANDARD

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Write for our Booklet "E" showing our Range Closets and Urinals and giving roughing measurements.

Plate F. 517

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The Destiny of Canadian Dollars

It is gratifying to note that the Vancouver School Board are taking a determined stand against awarding contracts to any but British concerns. Recently a United States firm that submitted the lowest bid on a school building were required to take out naturalization papers before an award would be made.

This is a move in the right direction. We want all the competition we can get in the Canadian field, but not to the extent of having United States concerns come into the country and erect the buildings upon which we spend our good Canadian money. In any case, these public bodies have a well-defined duty in this regard. It is gratifying to find that this sense of duty is appreciated at least in Vancouver.

In Eastern Canada there have been too many instances where contracts for important work have been placed with outsiders. The United States contractor imports everybody of any consequence required in connection with the work and as much plant and equipment as he can squeeze through the customs at a low valuation.

In cases such as these the money leaves Canada for good. It is distributed among the ninety millions on the other side of the border. If there were a dearth of competition in this country it would be a different matter, but with prices pared down as finely as they are at present there can be no justification for employing aliens. British contractors have the ability, the resources and the men at their command to meet any emergency that may arise in the Canadian field—from a country school house to a university or government building, and from the diversion of a stream to the construction of a second Panama Canal.

We entertain nothing but the best of feelings for our friends across the border, but when it comes to practical construction in our own field we must perforce dispense with sentiment. We have neither the opportunity nor the desire to encroach upon the field to the south of us; neither do we wish to be influenced by the business conditions that obtain over there.

In the East it is only the largest and best work that has gone to U. S. concerns in recent years. Often, when there has been a fair chance of making money, the opportunity has been denied Canadian contractors. In common parlance, they haven't had a "look-in." This sort of thing is discreditable to us. It is a reflection both upon our national spirit and upon our claim to average horse sense.

The Vancouver School Board are to be commended for bringing this matter into the limelight and it is to be hoped that their example will be followed throughout the country, not only by public bodies but by the large financial concerns and public service corporations, which have been built up by Canadian hands and Canadian dollars.

Canada's Consistent Building Growth

Building permits issued in the principal Canadian cities during the first four months of 1912 represented a total value of $44,333,760. The figures for the corresponding period of 1911 were $32,586,663. The increase for the present year to date is thus nearly $12,000,000, or 36 per cent.

Toronto occupies first place, with an expenditure of $6,508,825; Winnipeg is second with $5,030,710; Vancouver is third with $4,968,212; Calgary comes next with $4,117,098; the next place falls to Montreal with $3,745,180; Edmonton is 6th with $3,505,452; the 7th and 8th positions fall to Victoria and Saskatoon with totals of $3,367,575 and $1,775,805 respectively, while Hamilton and Fort William follow with totals of $1,573,000 and $1,227,775. Other cities that passed the million mark are Regina with $1,092,625 and Moose Jaw with $1,069,250. Out of thirty-five cities a decrease is registered in only five, the 1912 total being slightly lower than that of 1911 in the case of Vancouver, Montreal, St. John, Toronto and Regina.

These figures are illuminating as to the country's wonderfully consistent development. The universal character of the progress is an indication that these extraordinary returns are not inflated by local booms but are attributable to general prosperity obtaining throughout the country. Perhaps the western cities are making the best showing—their returns indicate an increase over last year of nearly 56 per cent.—but a careful student of the situation will be impressed none the less with the remarkable manner in which the more conservative cities of eastern Canada are holding their own.

These rapid and regular increases in the volume of building are coming to be regarded as a natural condition in the growth of our country. They are associated less and less with the idea of boom conditions. They are rightly held as tangible indications of a solid and stable growth. From the reports that have reached this office from the various constructional sources during the last month there would appear to be the most marked activity in the larger type of commercial buildings. The west particularly has been a large contributor to this class of work. In office buildings, warehouses and factories during the present year the expenditure will be greater than ever before, and a goodly percentage of this outlay should find its way into the pockets of those identified with the actual work. As for the manufacturer and the supply man, they will never find a more opportune time to show their aggressiveness. The improved construction now generally coming into favor in the west will stimulate the demand for the better class of material.

As usual there have been troubles and rumors of trouble in the labor world, but despite the aggressiveness of the unions, no serious tie-up has been recorded and, generally speaking, satisfactory agreements are in force between the employers and the various trades. There is the usual demand for skilled labor in the west. The eastern cities are fairly well supplied. Winnipeg has been more fortunate than other western cities. Calgary, Saskatoon and Moose Jaw have experienced a big demand for carpenters, bricklayers and stone masons. Also, the demand for unskilled labor in the west is reported greater than anything of the kind previously experienced.

Responsibility for Building Failures

THE inadequate inspection of buildings in the city of Toronto, a criticism of which was made recently in our editorial comment upon the Neilson building collapse, has been emphasized by the resumed enquiry into the disaster. Last week the assistant city architect, Mr. Price, admitted under examination that nine inspectors of the department were entrusted with the inspection of some 5,000 to 7,000 new buildings now under construction in the city. We do not believe that a competent man could make more than one dozen reliable inspections in a day—and that would scarcely give him thirty minutes on each building, but supposing that he were a regular whirlwind and accomplished twenty a day, allowing himself, say, fifteen or twenty minutes on each job, it would mean, at the rate of nine inspectors to 5,000 buildings and apportioning each man his share, that an inspector would only be able to put in these few minutes on a building once every three weeks! Of course many of these buildings are dwelling houses, and Mr. Price estimates that one inspector is sufficient for 150 of these structures, but that number is too high to insure efficiency and in any case the general average has sufficient bearing to show the absurd inadequacy of such inspection in a city whose population is gradually approaching the half million mark. In the district in which the Neilson Building was situated, the inspector was responsible for the supervision of some 250 or 300 buildings. At his own admission he was able to visit each one only once every ten days. There is ample justification in saying that inspection such as this is inspection in name only and that such a manner of enforcing compliance with the city's building regulations, of protecting the public, and preventing scamped work, is worse than a farce. Whatever may be the official verdict in such cases, the city cannot escape censure for its shortcomings, having once assumed responsibility.

Everything points to a year of great activity in the town of Dauphin, Man., and the surrounding district. Dauphin is a railway centre with a payroll of over one million dollars a year and is located in one of the most productive areas in Western Canada. The Canadian Northern are building a new $50,000 station there and the finishing stage is being reached in the new waterworks system which will cost $400,000. The streets and roads in and about Dauphin are generally good and the town has fifteen miles of granolithic sidewalks. Dauphin is a conspicuous example of western progress and ambition.

Scientific Management a Remedy against "Industrial Anarchy."

SCIENTIFIC management of construction work deserves careful thought for a reason wholly apart from its effect on the balance sheet of the contractor, says the Engineering Record. At the present time recruiting the ranks of the Industrial Workers of the World is proceeding at a great rate among the classes of labor largely employed on outdoor construction. The preamble of the manifesto of that organization reads as follows: "The working class and the employing class have nothing in common. There can be no peace so long as hunger and want are found among millions of working people, and the few who make up the employing class have all the good things of life. Between these two classes a struggle must go on until the workers of the world organize as a class, take possession of the earth and the machinery of production and abolish the wage system." In the face of such a declaration, brought to this country by immigrants upon whom contractors rely for labor to a large extent, it is manifest that something must be presented which will furnish an incentive to the laborer to change his views and to become a practical partner in the success of the contractor. Up to the present time nothing has been suggested which equals the scientific management principles as a remedy for mutual distrust if not open conflict. The interests of the employer and the employed are always the same in any firmly established, sound business enterprise. It is natural for the employee to wish permanent work at a large salary just as it is natural for the employer to desire to make the most he can from the investment of his capital and his abilities as an organizer and manager. Scientific management is successful because it shows how both ends can be gained; it appeals to loyalty and not to self-interest solely. It tends to develop among the men a feeling of pride in the work and of reliance on the fairness and good will of the employer as nothing else has done. For this reason it deserves study as a remedy against organized industrial anarchy.

True Definition of Art

Every human work made in any language with the purpose of expressing or stirring human emotion is a work of art; and a work of art is great in ratio of its power to stir the highest emotions of the largest number of cultured people for the longest period of time.

You must never forget that we consist of a body, a mind and a soul. The body experiences sensations, the mind excitements and the soul emotions.

We exist in our body, but we live in the soul and its emotions. The mind is a mere tool, the valet of the soul. The intellectual emotions are laughter, curiosity and surprise. The highest emotions of the soul are delight, awe and reverence. Hence it requires no long argument to prove that since our real life is in the soul, that that is the highest art which stirs the emotions of the soul. For by so doing it increases the volume, richness and nobility of our life.—F. W. Ruckstuhl at the University of South Carolina.

What Advertisements Mean to the Contractor

ADVERTISEMENTS may be grouped into three classes: first, publicity cards; second, reading advertisements that tell of products, and third, educational advertisements. The first is not of great value, except to the advertiser, and then only when some purchaser is sending to a number of dealers or manufacturers for catalogues or prices. Such an advertisement consists only of the name and address of the seller and the article or articles for sale. Inquiries or sales from such advertisements are seldom numerous. Reading them does no one any good.

The second class, namely, reading advertisements, may not only educate the readers, but may be the means of saving them much money. Such an advertisement contains a lot of print telling of the products advertised, either the work they will do or how they are manufactured and kept in stock, or it may tell a story, by reproduced letters or otherwise, of the success of some users.

The third class, educational advertisements, are similar to the second, except they are given over entirely to educating the reader. It may be that at present the reader is not a possible purchaser, but with the proper education he may soon become one. Such advertisements may be devoted entirely to instructing the public concerning an article manufactured and sold exclusively by the advertiser, but may also be used to boost a product of similar grade made by a number of manufacturers. Then the advertisement may do almost as much good to other manufacturers as to the advertiser who is paying the bills. This was the case a few years ago, when one of the leading cement companies spent thousands of dollars in educating the general public in the use of cement. This was some benefit to all the cement companies, but gave the one which paid the bills some prestige over the other companies.

All reading advertisements, both those referred to in the second and third classes, can be, and generally are a benefit to the reader. Advertisements, as a rule, are worded as strongly and as strikingly as the truth will permit, and for this reason they are impressive and may start new ideas and chains of thought in the mind of the reader.

An evidence of the power of publicity is the use of concrete mixers. Ten or fifteen years ago few were used. At present thousands are in use, and those that are best known and used most extensively are the most advertised ones.

The introduction of machines on contract work means the saving of thousands of dollars over hand labor to contractors. If a contractor does not read advertisements, he cannot keep himself posted concerning new machines that are placed on the market. To-day, he may not need a certain new machine, but within a year he secures a new job upon which such a machine can be used. His mind at once reverts back to the advertisements he has read. Possibly, the name of the manufacturer is impressed on his memory. He secures a catalogue or hunts up an old one, makes a purchase and reaps an added profit on his work. Knowing of such a machine, it is perhaps possible for him to underbid his competitors who are not readers of advertisements and so secure the job, when otherwise he would not have been among the low bidders. Such things have actually not happened once, but many times.

New uses for old machines are also told of in the advertising pages of the technical papers. A contractor finds that a certain machine is well adapted to some new class of work and informs the manufacturer. This information is published in his advertisements and the readers of them reap this benefit at once instead of waiting to discover it by chance, as did the original contractor.

As descriptions of machines and their uses, so methods of work and many good ideas as to management of a business are found in advertisements. One steam shovel company has for years published advertisements illustrating methods of doing certain classes of work. Another company selling some classes of excavating and rehandling machinery has told in its advertisement much that is of value in reducing costs even to those who have never bought a thing from it, and possibly never will. A dump wagon company, in boosting its own products, has laid down many good business principles and valuable hints on buying.

Often an advertisement is meant for one purpose, yet it will start a chain of thought in the reader's mind that will lead him to thinking, so that he will originate new ideas or think out things that will be a benefit both to himself and others. Only recently, an advertisement in The Contractor gave to the writer the subject matter for three editorials that have appeared in this journal, and it is to some extent responsible for this one. There is no telling, a thought once started, where it will lead to. Some of the greatest discoveries and inventions in the history of the world have had their origin in very little things. —Extracted from The Contractor, Chicago.

How to Obtain Satisfactory Bids from Good Contractors

By Richard Morey †

1. Give full and detailed information as to the work, all dimensions, quantities, classes of materials; everything that can possibly be used to figure costs.

2. Ask for bids on as many units as can be applied to the work. This may increase slightly the office work, but it will reduce costs. To use grading as a simple example, a contractor will bid lower and the work will cost the railway company less, if the proposals are made so as to separate bids on excavation hauled, excavation wasted, embankment borrowed, overhaul with a short free haul and all possible classifications of material. To the contractor this means that uncertainties are reduced to one or two items and that he will be paid for just what he does. To the railway company it means an elastic contract that readily covers the inevitable changes of line or plans, and that the company pays for just what it gets.

3. Rewrite some of the clauses in the contracts and specifications, particularly those which applied to former conditions, but do not fully cover present ones, and, especially, some of them which have grown from interlineations made from year to year in your printed forms.

4. Recognize the relation between the responsibility of the contractor and the requirements for the bond and the retained percentage. At the time the contract is signed, and the responsibility of the contractor is measured by the full amount of the contract, the railway company is satisfied with a bond; later, as the work is near completion and part of it even in use, the railway company still has the bond and also the

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† [illegible]

retained percentage and the contractor's responsibility has become insignificant

5. Give us as inspectors men whose knowledge of the work at least approaches that of our foremen.

6. Give us our full quantities on our monthly estimates and then see to it that the vouchers made to cover those estimates move promptly through the auditor's office to the treasurer.

Proposed British Standard Tests for Concrete and Reinforced Concrete

THE Tests Committee of the Concrete Institute of Great Britain have submitted a progress report dealing with certain tests of materials, and of reinforced concrete structures on completion.

Materials

Coarse Material.—The report does not take into consideration, for reinforced concrete, any coarse material which does not pass a ¾ x ¾-in. aperture and is not retained on a ¼ x ¼-in. aperture.

The classification adopted for coarse material is as follows: (a) Pit gravel, (b) pit gravel crushed, (c) river gravel, (d) river gravel crushed, (e) sea gravel, (f) sea gravel crushed, (g) crushed rock, (h) crushed brick, (i) crushed slag, (j) clinker and coke breeze. Classes (i) and (j) are not recommended as suitable matter for reinforced concrete.

Grading.—The committee is of the opinion that to obtain the best results in concrete, the coarse material and sand should be properly graded. Unfortunately the principle of grading coarse material and sand is very little resorted to, and consequently there are few data on this important subject.

The result of a series of tests shows that the percentage of voids in materials varies according to the different sizes and grading from 35 to 48 per cent.

Sand.—The report does not take into consideration, so far as applied to reinforced concrete, any sand which does not pass an aperture of ¼ x ¼ in., and which is not retained on an aperture of 0.02 x 0.02 in.

Sand used in concrete work is as follows: (a) pit sand (other than that of glacial origin), (b) river sand, (c) sea sand, (d) grit or sand from crushed coarse material.

It is important that all sand that is not retained on an aperture of 0.02 x 0.02 in. should be rejected. The following results of tests have been submitted to the committee as showing the deleterious effect of allowing dust to remain in the sand:

The test specimens were made of 1:3 mortar. The compression tests showed a strength of 2,789 lb. per square inch at the end of 28 days, using British standard sand and cement, and only 606 lb. using crushings from porphyritic granite and blue-gray whinstone to pass a 30 x 30 mesh sieve, including all dust. The tensile tests gave strengths of 182 and 234 lb. at 7 and 28 days with the standard sand, and only 53 and 104 lb. with the dust-laden material.

The percentage of voids in sand varies from 23 to 40 per cent. According to the various proportions of graded coarse material and sand, the percentage of voids varies from 24 per cent. to 30 per cent.

Cement.—All cement should be tested and analyzed in accordance with the Engineering Standard Committee's latest specification. The Tests Committee of the Concrete Institute strongly recommends that in addition the crushing strength of the cement should be ascertained in the following manner:

Cubes mixed in the proportion of 3 parts of standard sand to 1 part of cement, by weight, shall be made up and treated in all respects similar to briquettes of sand and cement for the tensile test, but the test specimens for crushing to be 3-in. cubes. The crushing strength shall not be less than ten times the tensile strength at 28 days required by the British Standard Specification.

Water.—The committee is of the opinion that it is not advisable to define the proportion of water to be used in making up concrete or test specimens of cement and concrete, as this quantity must be more or less dependent on the variations in the weather and the nature of the coarse material and sand used in each particular case; but it is generally considered that the concrete should be mixed to a plastic state, though not so wet as to allow any dripping of the cement, water and sand.

Steel.—The following tests are recommended for all steel work for use in reinforced concrete.

The steel shall attain an ultimate tensile strength of not less than 60,000 lb. per square inch.

The steel shall withstand a stress of at least 34,000 lb. per square inch before showing any appreciable permanent set.

The contraction of area at fracture shall be not less than 45 per cent.

The elongation in the case of bars of 1-in. diameter and under shall be not less than 25 per cent. measured on a length equal to eight times the diameter of the bar tested. The elongation shall be measured in the case of bars over 1-in. diameter on a length equal to four diameters of the bar, and shall be not less than 30 per cent.

All steel shall stand bending cold to an angle of 180 degrees around a diameter equal to that of the piece tested, without fracturing the skin of the bent portion.

The steel shall be free from scabs and flaws.

Crushing Resistance of Concrete.—For the purpose of ascertaining the crushing resistance of concrete the committee recommends that the following particulars shall be complied with:

All test pieces shall be 4-in. or 6-in. subes.

Number of test specimens for each test shall be six.

Three cubes shall be made in the laboratory and three for each test shall be made on the works.

The cement for each series of cubes shall be taken from the same consignment.

All laboratory-made test cubes shall be made as far as possible on practical lines, so that the results of the tests shall be such as can be reasonably expected from concrete in the actual work with proper care and attention.

Specimen cubes from the works shall be made with concrete taken from the actual mixing platform; the concrete used for the specimen cube shall be taken from the various batches of concrete prepard for use in the works.

In all cases specimen pieces shall be made in metal moulds, and the concrete worked in by "punning" and "tamping" and afterwards gently rammed.

Reinforced Concrete

It is frequently specified that test loads should be applied to finished structures of reinforced concrete shortly after completion. It should be recognized, however, that such tests should in no wise reduce the care to be exercised in the supervision of the work by those responsible. Since the test loads are generally applied only to specific parts of the work, such tests do not necessarily prove that the work has been properly executed either in whole or in part.

The test load should not be applied to any part until the expiration of 90 days from the last day of laying the concrete.

The deflection of beams under a test equal to the full working load for which the beams were designed should not exceed 1/1000th of the span.

In order to impose the full load upon a floor or roof beam under test the two bays of floor or roof adjoining require to be loaded all over, otherwise a considerable portion of the load is transmitted to the adjoining beams and the full load does not come upon the beam under test.

Not more than the superimposed load for which the beam has been designed, plus 50 per cent., should be applied as a test load.

When test loads are applied the materials used for loading should be put on in such a manner that no arching action whatever can take place, otherwise incorrect results will be obtained.

If systematic and thorough supervision be given by the professional adviser during course of construction the application of the test loads to the finished structure is not so necessary.

Test cubes, if kept in an even temperature, which should be the same as that specified for cement briquettes, form a means of gauging under standard conditions the resistance to thrusting, and cubes kept in the open air will give the values for the concrete in actual practice. The results of these two sets of tests will be helpful in determining at what age the work is strong enough to sustain the loads.

Fireproof Construction—Lessons from the Equitable Building Fire

THE report of the New York Board of Fire Underwriters on the destruction of the Equitable building on Jan. 9 of this year is a document of permanent interest to those engaged in architectural engineering. It gives the results of a careful examination of the ruins and a summary of the conclusions regarding building construction which are drawn from the effects of the conflagration on the various materials in the building. The case is a particularly interesting one, because the structure was built in stages. The original building was five storeys high and about 87 x 135 ft.; this was erected in 1869. Later the 135-ft. front was increased to 234 ft., and in 1886 the 87-ft. front, which is the one on Broadway, was extended to 195 ft. The original portion of the building was then increased in height to eight storeys and about the same time the building was extended back to a rear street, so that it finally occupied the entire block, with an area of about 48,000 sq. ft. Collectively, therefore, the Equitable building consisted of five buildings erected at different times. It was of so-called fireproof construction, most of the floors being of wood on brick or hollow tile arches between wrought iron or steel I-beams. The beams rested on walls and on columns, usually of cast iron, but occasionally of small wrought iron sections.

The temperature developed in the fire are estimated to be slightly lower than those observed in fires in other so-called fireproof buildings. Glass and brass fixtures in the upper part of some rooms were fused, indicating a temperature of about 1600 deg. F. at least. In the dining rooms and kitchens silverware was fused. On the other hand no cast iron or steel parts were found to have been melted, indicating that the temperature did not reach 2200 deg. F. The hottest fire was apparently around certain light shafts and at places in the basement where the insulation on electric wires burned.

Wrought Iron Columns Behaved Well

As before stated, most of the columns were of cast iron, ranging from 6 in. in diameter and 3/4 in. in nominal thickness of metal in the top storey to 14⅜ in. in diameter and 1⅜ in. in thickness of metal in the basement. There were some wrought-iron Phoenix segmental columns and a few box columns of two 6-in. wrought-iron channels with two or four plates. In the oldest part of the building the destruction was the greatest, and here the collapse of the structure was apparently due to failure of one or more of the cast-iron columns. Some of them were fractured entirely across and the brackets of others were cracked or partly broken off. In a number of cases the column was cracked above the bracket, but the latter was intact. Occasionally the brackets deflected without any fracture, indicating a softening and bending of the column. Many very defective columns were found, due to the shifting of the cores, so that in places the metal was little more than 1/8 in. thick. Speaking generally the wreckage indicates that the wrought-iron columns behaved much better than those of cast iron. There seems to be some question, however, whether the cast-iron columns were so well protected as those of wrought iron.

The majority of the floors in the building were of wood. In the upper storeys the sleepers were protected on each side by hollow tile laid loosely on a cinder concrete fill. In the lower floors cinder concrete was used as a filling between the sleepers. In some places in the old part of the building 4-in. segmental brick arches of 5-ft. span were used between the floorbeams, but as a rule hard burned terra cotta was employed. On most of the floors the wood was entirely consumed, even the sleepers between the terra cotta tile filling being burned. The terra cotta and brick arches withstood the fire well, and little falling of the lower webs of these arches was found except in the basement in the neighborhood of the electric wires, where the heat from the burning insulation was very intense.

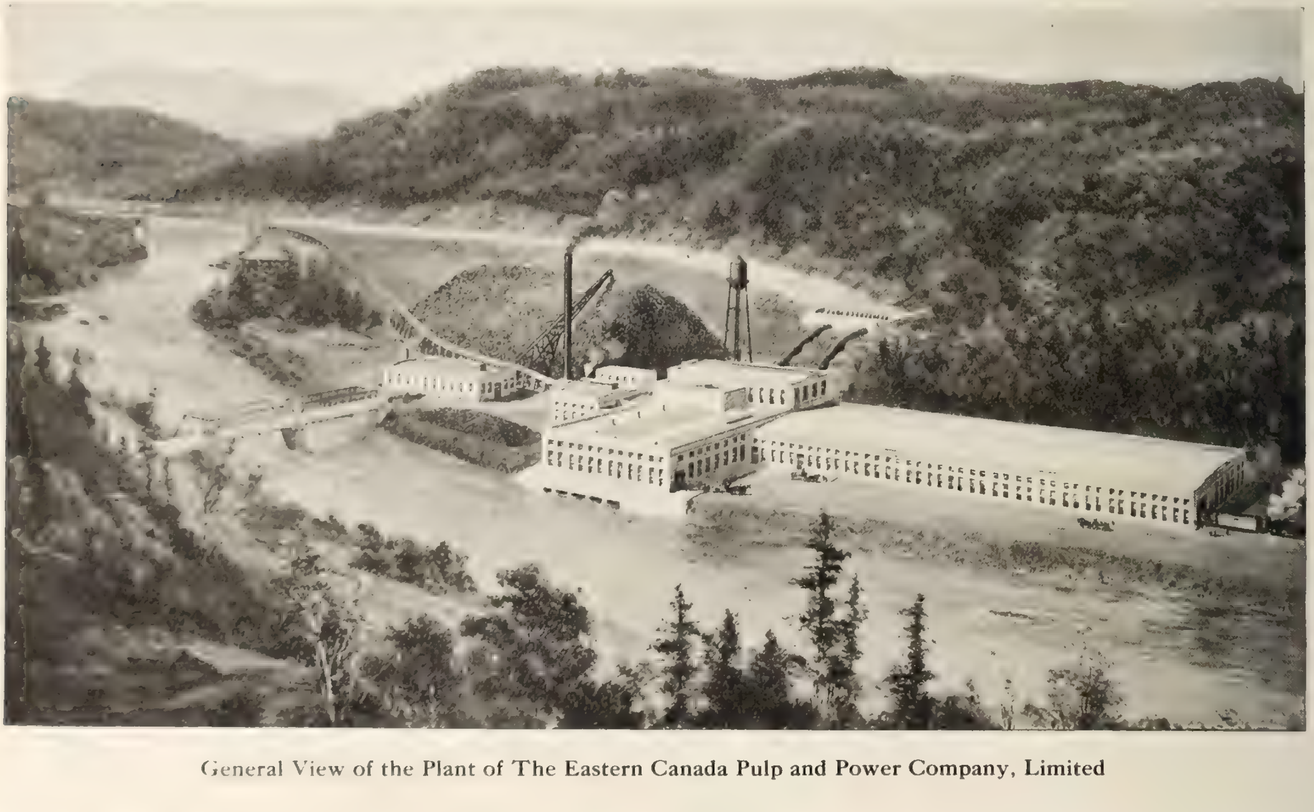
Inflammable Contents of Fireproof Buildings

Various forms of partitions were used in the building. Some were 4-in. terra cotta extending from the floor to the ceiling, others had a tile base with wood and glass above, some were entirely of wood, some were of 4-in. hollow plaster blocks, and some were of metal lath and plaster. All doors and trim were of wood. The tile partitions from the floor to the ceiling were mostly in position after the door frames burned away. All others were more or less damaged. The condition of the partitions leads to the conclusion that it is unsafe to assume that a fire cannot spread quickly in office buildings. Such structures contain a large amount of highly combustible material in the form of furniture, books and papers. Under such conditions fireproofing is of the highest importance and it is manifestly desirable to construct partitions which will act as fire stops as well as mere sub-divisions of office space. The tenants of the Equitable building whose business was interrupted seriously by this fire will probably agree that they will willingly spend a considerable sum to be insured against any repetition of it. This is really one of the most important lessons to be drawn from the Equitable fire, says the Engineering Record, from which this comment is taken. It taught very little that was new, but it emphasized very strongly many things which are likely to be forgotten or underestimated. Architectural engineering is able to produce practically fireproof structures, considered merely as structures, but the contents of buildings used for office purposes are so inflammable that serious fires are sure to occur from time to time unless adequate fire stops are provided on the different floors, and the only way in which these can be provided is by adequate partitions. The Equitable fire clearly demonstrates that it is just as dangerous to have large unbroken floor areas in an office building as in structures devoted to mercantile and manufacturing purposes, and it points to the desirability of installing automatic sprinkler systems in them to check any fire before it attains serious proportions.

Contract Work on the Malbaie River, Que.

Building a Solid Dam, 51 feet high, and a Concrete-Lined Canal—An 8-mile Haul of Plant and Supplies

INTERESTING operations were carried out last season by the Bishop Construction Company, Limited, of Montreal and Toronto, in connection with a pulp mill of 120 tons capacity on the Malbaie River, at Murray Bay, Que., for the Eastern Canada Power & Pulp Company. Operations were commenced in December, 1910, and the work was completed two or three months ago. The main features of the contract are a solid dam, 51 feet high; a concrete lined canal leading to the headgates of the penstocks; and the mill buildings, consisting of wet machine room, generator room, wood preparing room, pump house, grinder room, wheel pit, block bin, engine room and boiler house. All the supplies and plant had to be hauled eight miles from Pointe au Pic.



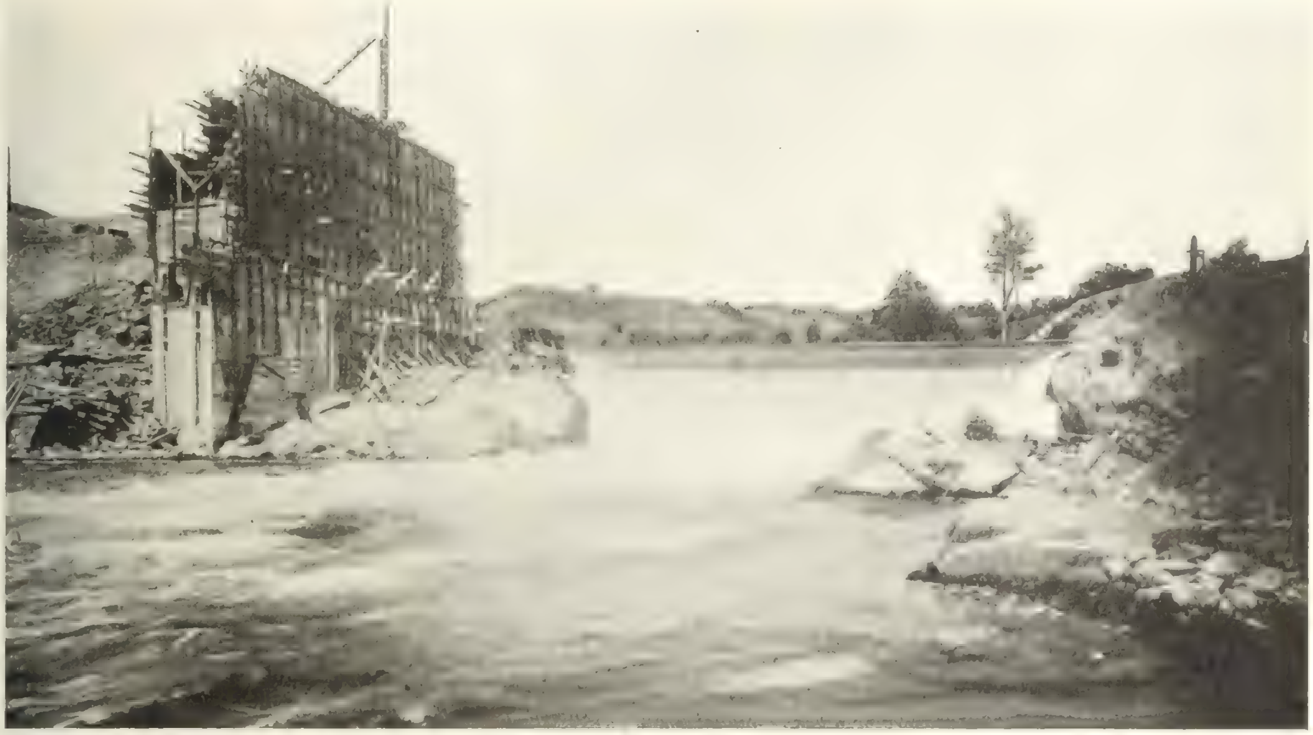
General View of the Plant of The Eastern Canada Pulp and Power Company, Limited

The Bishop Construction Company also built last season eight miles of railway, this being the section of the Quebec and Saguenay Railway between Pointe au Pic and Nairns Falls. This section, whilst feeding the villages of Pointe au Pic and Murray Bay, will carry the products of the mill to the wharf at Pointe au Pic.

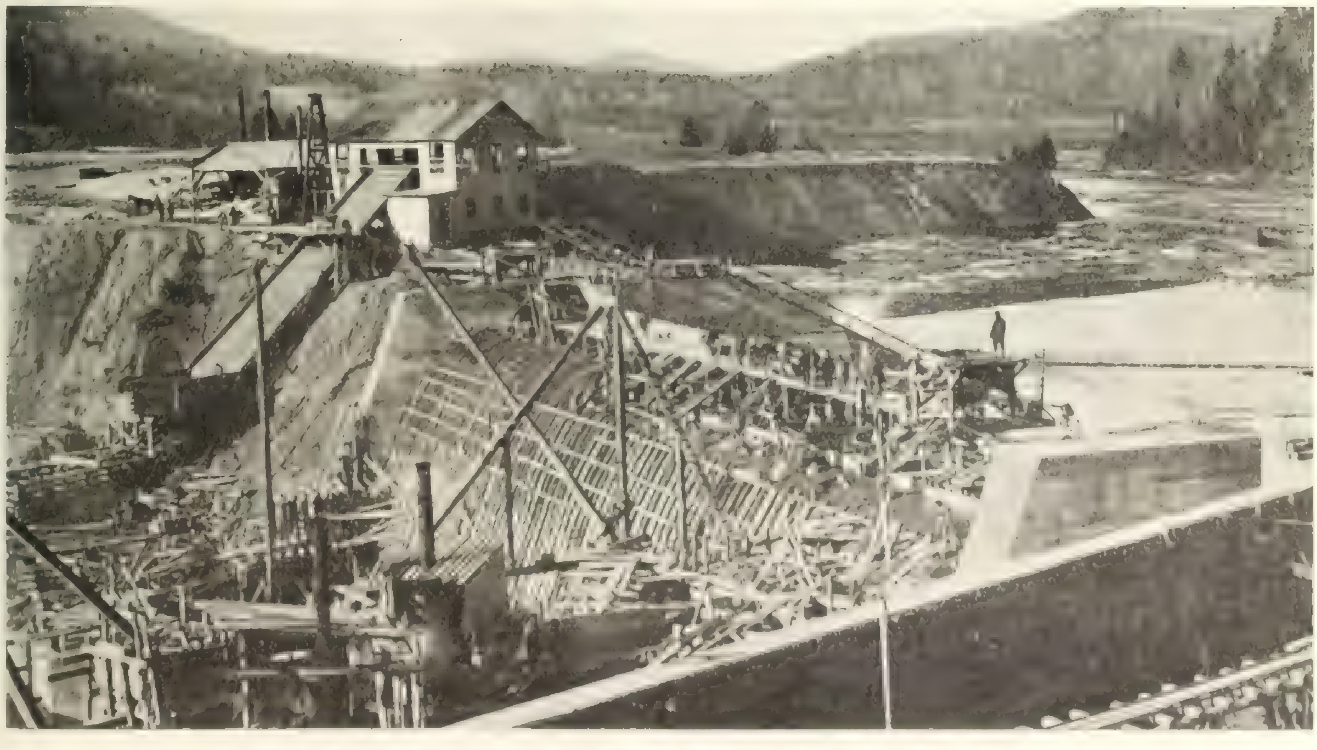
From the west end of the dam, a core-wall, 50 feet deep, runs through a small projection into the solid bank. The dam contains 6,500 cubic yards of concrete; in addition, the headgates, bulkheads, dam abutments, etc., contain 11,500 cubic yards. There are also 2,000 yards of superstructure concrete and 2,000 yards of reinforced concrete. There were 20,000 cubic yards of rock excavation. On the west side of the dam is the cutting-up mill, from which the wood is conveyed across a steel bridge and a cedar trestle to the mill.

Considerable difficulty was experienced in the excavation of the wheel-pit as the original bottom was of running sand, with about four feet of boulders on the top and with the Malbaie River running close alongside. An excellent jagged rock foundation disclosed itself for the dam, as for the headgates.

A portion of the canal was through rock cut. The

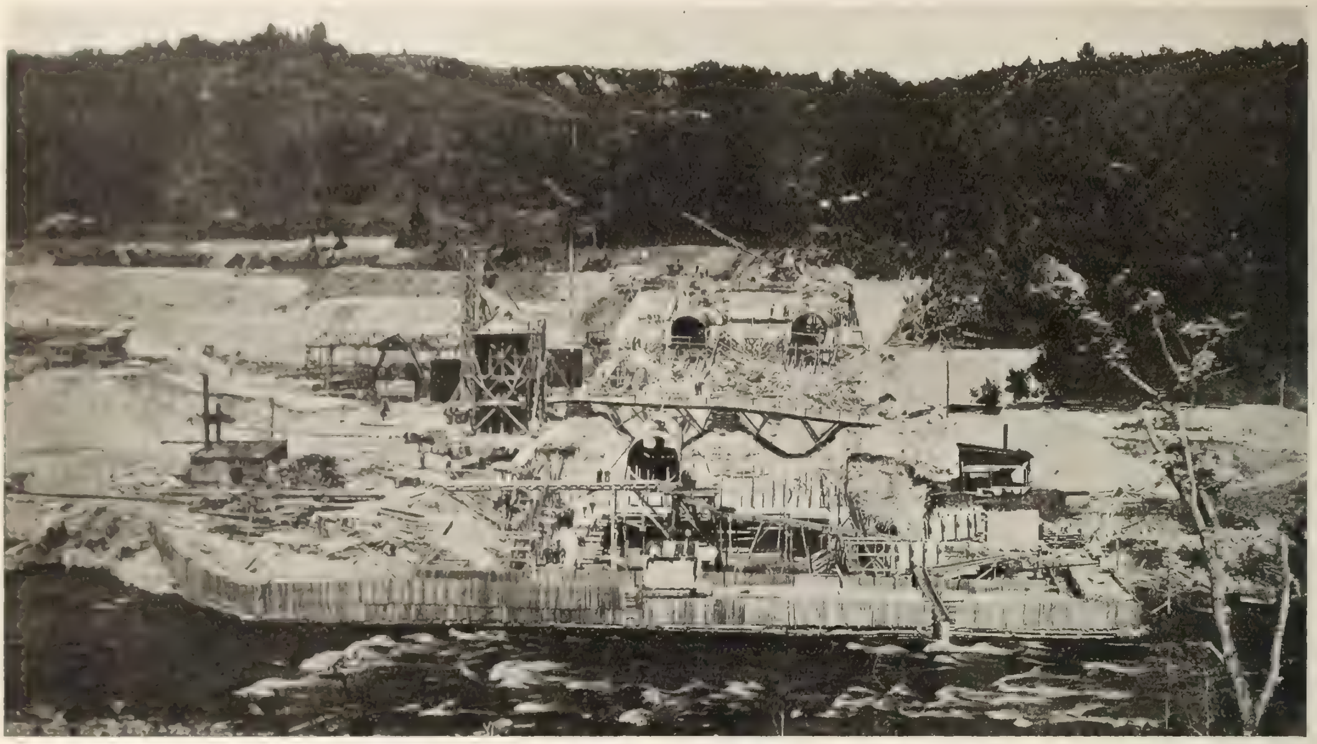


View of Abutment showing old Dam

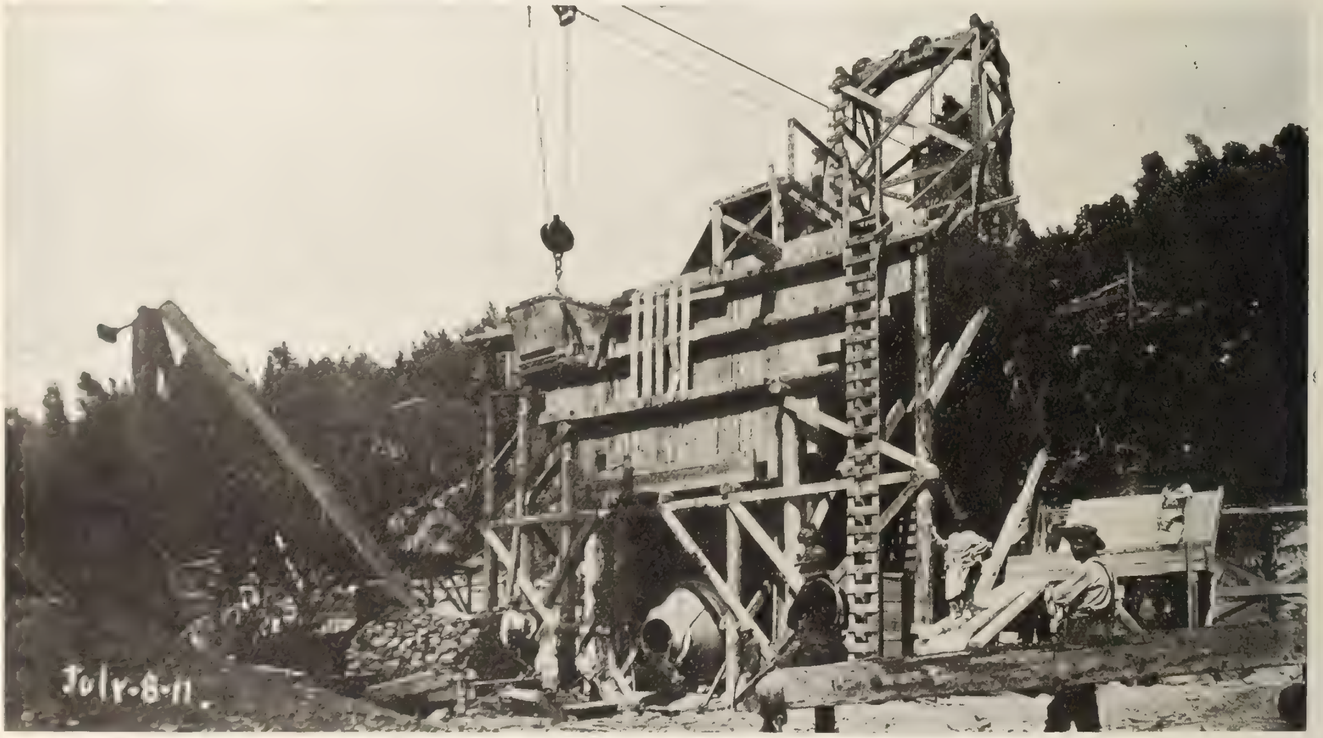


View showing Cutting-up Mill and Concrete Gravity Dam 52 feet high

CONTRACT WORK ON THE MALBAIE RIVER



View showing work on Grinder Room foundations and Power House



Concrete Mixing and Distributing Plant

CONTRACT WORK ON THE MALBAIE RIVER

View of Bulkhead Wall

View showing Construction of Grinder Room Building

earth part was lined with reinforced concrete. Two stone crushers were employed and the rock out of the canal was used in the concrete. The stone from the crushers was loaded by a clamshell bucket into cars on light rails. These cars were hauled to the mixer installations and hoisted up and dumped into bins. Other bins were provided for the sand and the cement, which were also loaded by a clamshell bucket fed from a platform just above the mixers. A cableway was used for the building of the dam and the concrete was dumped directly from it. Sand was fed to the mixer plant at night time by the cableway. A sawmill was installed on the work and all the lumber used was taken from logs in the river.

Chemically precipitated sewage was applied to one of the experimental sprinkler filters at Worcester, Mass., last year, and its effects upon the piping and crushed stone are commented upon by Mr. Matthew Gault, superintendent of sewers, in his last annual report. Milk of lime is the precipitant employed. During cold weather, a coating of carbonate of lime was formed upon everything with which the chemical effluent came in contact. This deposit did not clog the filters, but its presence was often detected by the crystals glistening in the sunlight. When the bed was allowed to dry, the coating on the stone took the form of a fine white powder. The continual deposition upon the inside of the inlet pipe made it necessary to open the valve wider and wider until finally the pipe would no longer carry the required amount and had to be cleaned. The piping connected with the siphon often became so reduced in size that it had to be washed out. The sprinkler nozzles had to be cleaned frequently. In zero weather the orifice was reduced from 3/8 to 1/4 in. in less than 24 hours. When the temperature was above 10 deg. Fahr. comparatively little trouble was experienced from this source. During October and November, 1910, the sprinkler filter was being supplied with chemical effluent at the rate of 2,000,000 gal. per acre daily. Although this length of time should have been sufficient to establish the proper species of bacteria, according to Mr. Gault, purification was very slight, indeed. Beginning with December, the rate was cut down to 1,000,000 gal. per acre daily. Considerable improvement was shown, but the effluent was still very unsatisfactory.

Recent continental tests on the wearing qualities of various bronzes rubbing against well-lubricated smooth steel show that the wear is proportional to the content of tin. The introduction of phosphorus produces a bronze with better wearing qualities than non-phosphorus bronze with high content of tin. The tendency to crystallize by heating is met with in bronze as well as in steel, such crystallization facilitating plastic deformation of the bronze.

View of Canal

View showing Construction of Head Gate Wall

Eastern Canada Pulp and Power Company's Plant at Murray Bay

The Protection of Concrete Surfaces

Conditions Which Govern the Application of Various Methods and Materials—Interesting Points brought out in Discussion*

By Robert Cathcart

THE protection and treatment of concrete surfaces in recent years, owing to the increasing usage of concrete and cement in modern building construction, have been problems necessitating very careful investigation and research by the engineer, architect, surveyor and builder. Many ideas for the accomplishment of the above have been suggested and tried. But the great difficulty that immediately confronts the average investigator is the applicability of the protective or finishing materials to that of concrete.

Appreciation of the connection which exists between the physical elements of concrete and those of other building materials, such as natural stone, brick, terra-cotta, wood, etc., and their relative differences to weathering and wearing, has to a large degree limited exterior concrete surfaces.

From various opinions of architects, engineers, and builders, it would seem that a proper method for the protection and finishing of external concrete surfaces would undoubtedly promote the extension and use of monolithic concrete structures, which under existing conditions have to be faced with building stone, terra-cotta, or brick. However, Portland cement concrete is a fire-resisting and economical building material, and its great utility in all classes of construction has placed it in a position beyond that of others, and its needs for protection and finishing are imperative. The great obstacle to the decoration and finishing of concrete has been, in the main, first, that no particular attention was paid to the selection of the aggregates in the mix, or their influence upon the resulting surface; second, the methods of mixing and placing the aggregate and forming.

Concrete, therefore, is subject to many conditions which make the methods and modes of protection and finishing a difficult problem—for instance, discoloration and variability of color, which are due probably to the bleaching out of the lime compounds and their disposition upon the surface in the form of "efflorescence;" or, in cases of excess water being used in the mixture, the surface in such places would give a "laitence" face, which is a thin impermeable formation caused by the lighter particles of the cement floating to the surface, or roughness due to the irregularity of the "form" work; carelessness in the preparation of the form to receive the concrete, or too long a period elapsing after the preparation of the form to receive the concrete, deposits of foreign matter, such as sawdust and hardened mortar, the choking of the mix in the forms, or insufficient tamping.

The density and porosity of a concrete surface is largely governed by the amount of the gauging water, its mechanical mixture, and the mechanical method of placing. The main object in procuring density in concrete is for water-tightness, the protection of the metal reinforcement from corrosion, and from loss of its adhesion with the structure. We have therefore three surfaces to consider in the protection and finishing of concrete:—

(1) **Dense Surfaces.**—These are generally obtained by the careful selection of the aggregates, their method of mixing, and placing under normal temperatures.

(2) **Porous Surfaces.**—These may be caused by the leanness of the mortar, or a fat mixture concreted dry, or the loss of the mixing water by absorption through the forming or insufficient tamping, the addition of bad mixing water, adulterated additions to the cement, concreting in heat or cold. This concrete is particularly sensitive to temperature changes, and the metal may be corroded by the presence of moisture entering through the porous surface.

(3) **Mortar-face Surface.**—This is generally produced by the excessive use of water to obtain impermeable surfaces for reservoirs and other heavy construction work, or the excessive damping or tunning of the aggregate to the back of the form. This concrete, when applied to the forming, is generally what is termed excess moisture. It has one very great objectionable feature regarding the surface protection and decoration in that it "crocodiles" and spalls owing to shrinkage, due to the difference of the coefficient expansion or contraction of the outer or inner surfaces. This is a surface that has caused a great deal of criticism on external concrete surfaces because of the light hairline cracks—which we call in the paint world "alligating"—and the small areas of surface which spall or scale, giving the average layman an idea that a concrete external surface is not one that would compare with the average natural or artificial facing materials.

"The external influences of the atmosphere and atmospheric gases upon surface elements of concrete demand a treatment for its preservation."

Surface elements show their destruction in various forms of disintegration:—

Cleavage and Parting.—The swelling and contraction of the crust against the grain bond and the binding substance by the alternate action of heat and cold, During the calcination of the materials the chemically combined water is driven off, and during this process a shrinkage due to the withdrawal of this moisture in concrete is a very important factor. For instance, in a 1:2:6 concrete the coefficience of shrinkage during the calcination is equal to about ¾ in. per 100 ft., while a temperature of 121 deg. Fahr. would be necessary to cause the same contraction as results from the loss of moisture, The coefficient changes with the various richer or weaker mixes. The additions of hydrated lime and lime compounds are sometimes added to mixes to equalize this condition, but, when added in excess, generally swell and disintegrate the surface. They have not to any degree of satisfaction fulfilled the purpose.

Fracture.—The loss of adhesion by the softening of water against the grain bond and binding substances. A surface may appear perfectly dry, yet percolation may be actually taking place. Water can pass through construction so slowly that the evaporation from the outside proceeds more rapidly than the water can reach the surface.

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*Paper presented recently before the Paint and Varnish Society.

Permeability.—The saturation of the porous strata by capillarity, gravitation, or immersion under water, or the gaseous products of combustion in the atmosphere. It would seem that the filling of the superficial voids upon the surface with water or vapours would have a tendency to fill those voids with a crystallization of the salts in the pores, and this would be accompanied by swelling, causing disintegration. For protection against such entrance, a strictly waterproof repellant would seem necessary.

Hardness.—The inability of the binding substance, cement, to resist friction, causing powdering or "sanding up." This is applicable to both weathering and wearing surfaces. "Sanding up" on concrete may be due to a great many mechanical causes—soft sand, loam or other foreign matter in the sand, poor mixing, excess sand over cement, loss of time between mixing and placing, mixtures too wet or too dry, the use of dryers, the lower layers of concrete not being able to take care of the excess moisture in the mix. This surface cannot be trowelled owing to its moist condition, taking its initial set before it can be finished, thus reducing its strength.

The problem of available means and resources for the treatment of concrete surfaces has generally been governed by the materials that were depended upon for supply and general custom. Therefore cements and limes, made into plasters for rendering, have probably been the most available sources of supplying the need for their necessary protection and treatment.

Concrete exterior finish for large, massive work, such as bridges, abutments, factories and general building exteriors, has been subject to treatments which may be termed mechanical. They are executed either with a mechanical or hand device by skilled or unskilled labor, and are known as picked surfaces, scraped surfaces, rubbed surfaces, bush-hammered surfaces, tooled surfaces, sand-blasted surfaces, etc. All of these mechanical treatments have been worked towards a betterment of surface appearance; but they do not tend to give any protection, and, being for effect only, they have no weather-resisting properties.

The proposed specification for scrubbed concrete surface, issued by the National Association of Cement Users, is to scrub the original surface immediately on removal of forms until the surface film is removed and the aggregate exposed to a uniform degree. It also includes the filling of void spaces and the removing of hard spots with a 1 to 10 solution of muriatic acid and water. This method should give a betterment towards the surface conditions for the protection and finishing of the surface. This method can only be done while the concrete is in a fragile state, which may mean the day after placing or later, depending upon the weather and setting of the cement. However, the increased cost for the removal of the forming, and the danger pertaining thereto on various classes of construction, might tend to increase the danger of disturbing the aggregate and reinforcement during the hardening process, although there are quite a number of surfaces that can be treated in such a manner.

There is another method, namely, chemical, closely resembling that of the scrubbed surfaces, which removes the original surface by the use of a solution of commercial muriatic acid while the surface is still green, after the forms have been removed. This method is to expose a selected aggregate, which is placed towards the face of the forming, specially selected for its lustre and general appearance. For small members cast in units this method is making some considerable headway; but in monolithic construction the difficulty of obtaining uniformity of the aggregate giving texture, and the cost of removing the outer surface, with the objectionable feature that the muriatic acid may stain or discolor the aggregate, and the excess in cost, do not warrant this method of treatment. From experience of the mechanical, chemical and rendering methods, they seem to be actually condemned where there is the slightest presence of moisture.

The paint chemist has put forth a considerable amount of energy towards the production of materials for the protection and finishing of concrete surfaces. He has confined his investigation generally along two lines:—

First, to obtain a material, coating or size that would neutralize the free lime upon the surface; second, a superficial filling of the pores upon the surface to stop suction. Much experience has been derived from the first line of investigation, and the principal exponent of this method has been Mr. McNichol, of Washington, D.C., who used a solution of 8 lb. of zinc sulphate to 1 gallon of water, for the neutralization of the free lime upon the surface. Other methods have been weak solutions of hydrochloric acid, applied to the surface, to neutralize the free lime. The second method of filling the superficial voidage has been to use substances soluble in water or naphtha applied to the surface, such as soap, fluxes of wax or grease, soap and alum.

The first and second lines of investigation developed what may be readily termed shallow superficial treatment for concrete surfaces. It was one that was much in request by architects, engineers, surveyors, and builders during the earlier stages of concrete. Its apparent advantages were that it filled the superficial voidage at the surface, and gave the surface a protection against moisture and discoloration. The failure of the superficial method which consists of the introduction of a solid substance in an aqueous or volatile medium is that the volume of the solid, as introduced into the voidage, as compared with that of the medium, is so small that, after evaporation takes place, so small a quantity of solid is left that, although itself insoluble in water, it is easily washed out with heavy rain or seepage. Many patented processes of paraffin wax in solution for the treatment of concrete, brick and stone surfaces, and applied by heat, are carried on by waterproofing and stone-restoring contractors.

The protection and finishing of concrete and cement surfaces now resolves itself into the consideration of two factors:—

First, the necessity of maintenance against disintegration; second, their finishing and decoration. Before passing from external weathering surfaces let us consider a concrete wearing surface.

Floors.—Concrete floors, when laid and finished under the strictest specifications for density, texture and uniformity, are sometimes subject to external injury, temperature changes and varying conditions, owing to the time, place, and method of completion. The outer character of integral and bonded wearing surfaces and their surface elements are much the same as those described for external surfaces. After mixing and trowelling, very little free water should appear upon the surface, even after thoroughly spreading, as an excess of water in the mixing is likely to crack the finish, due to shrinkage.

A mistake that is sometimes made on concrete floors is that they are sprinkled when hot, during their setting period, and often they are sprinkled while the mortar is too soft to resist the washing action of the water. The dusting of top material is quite a detrimental factor to the wearing surface and produces a surface element which indents, spalls and scales, and gives other bad defects to the floor, although slight freezing would give exactly the same effects, causing disintegration. Smoke gases from open braziers which are often placed in the building to increase the temperature have a tendency to retard the setting, on account of their carbon dioxide exerting a harmful effect on hydraulic cements setting at a temperature of about 42 deg. This action may be only a superficial one, but will cause a dusting of the floor.

The maintenance and protection of a concrete floor is an important factor to their service. The determination of the cement and the sand in concrete floors to lose their elements of adhesion as a wearing surface is a well know fact. The frail constituents of the binding substance are removed by the softening action of water, oil, grease, acids, etc. The harder constituents of the grain bond are loosened by their loss of adhesion and worn down by friction.

Waterproofing against a hydrostatic pressure is an engineering problem of much moment, and generally governed by its individual character. Therefore it seems unnecessary to treat this subject here at any length, because of its purely engineering character.

The subject of finishing and protection may be divided into three distinct methods—integral, superficial, and physical. The integral method of finishing concrete is one that may carry with it a coloring material, combined with the waterproofing material for producing a surface texture and finish, applied either by a rendering or integral with the construction at the time of casting or concreting.

The superficial method of finishing a concrete surface may be that of scrubbing the surface with water or acid, and then filling the superficial voidage with a cement wash. This wash is sometimes colored to gain uniformity, or used in the natural color of cement. The objectionable features to this method of finishing an external concrete surface are: that the amount of water used, in comparison with the solid cement, is so large that the surface is never a homogeneous compact mass of solid material. The amount of voidage under this surface caused by the entering of the water and the difference in expansion and contraction of this wash or grout to the inner surfaces causes the cracking, scaling and spalling of this light crust. This is the surface that has caused many concrete decorative failures, because of its lack of binding properties.

The Physical Method.—This is a coating of materials specially adapted for preventing contact between the atmospheric elements and the construction. This method should carry with it two features in one operation. They should be damp-proofing and decorative.

In conclusion, a line of investigation to follow for the testing of materials for their applicability for the protection and finishing of concrete surfaces may be outlined as follows:—

It would seem necessary in the light of investigation that the use of acids or acid re-agents, used as primers or vehicles for concrete weathering or wearing surfaces, would not be advisable for the reason that they would leave a very unstaple bond to apply any succeeding treatment.

The protective properties and decorative effect of a treatment and its resistance to moisture and decomposition by free lime, water, acids, oils, and gases seems to be the necessary qualification for an article manufactured for this purpose—that is, the protection and finishing of concrete surfaces.

DISCUSSION[*]

Mr. J. G. McIntosh said the author had condemned the acid treatment as a whole, but there were acids and acids, and he would draw attention to linoleic acid, which would combine with free lime to form an insoluble lime soap, and he wished to know whether a dilute solution of that acid, either in white spirit, or, better still, in methylated spirit, applied to concrete would be of any effect. It was hardly possible to apply any paint to a very wet surface, but Mr. Toch assured him it was possible to apply a certain paint, the formula of which he did not divulge, to green concrete. Then he should like to know whether the present grey color of concrete was necessary. As far as he understood, the clay ingredient was too frequently Thames mud, whose color could not very well be altered, and the lime was made from chalk, which when burnt was a pease-pudding yellow, slightly whiter when it was slacked. There were occasions where cost was no object, when a white, higher-class concrete might be advantageous, when china clay might be used as one of the ingredients and a high-class white lime might be another ingredient of the Portland cement for making such a concrete, the sand used being silver sand. Mr. McIntosh also asked what coating Mr. Cathcart would recommend to protect the floor of a sugar house, seeing that lime is soluble in sugar liquors. Would a solution of sugar do to dissolve the lime efflorescence on the concrete instead of hydrochloric acid? For one thing, it would not form a deliquescent compound with the lime, like hydrochloric and acetic acids. He would also like to know whether it was the paint used on the concrete buildings of the town of Baltimore that caused the conflagration that occurred there some two years ago to spread with such phenomenal rapidity, and if it was the paint that caused this, whether it was the indoor or the outdoor paintwork, or both?

Processes of Application

Dr. Blackler said that undoubtedly the mechanical treatment necessary for the production of good, sound concrete was not always duly considered. The various ingredients required careful selection, and as the process was one that was carried out in England by unskilled labor unless proper supervision was exercised, so that the constituents of the concrete were thoroughly incorporated, failures were very liable to occur. Facing the concrete surface with cements, Mr. Cathcart said, had proved unsatisfactory because of the "alligatoring" that took place, but paint chemists were much more interested in the processes of applying paint to the surface of the concrete. For concrete flooring the use of sodium silicate had been suggested, and it was stated that it hardened the surface, and to a great extent acted as a waterproofing material. The protection and decoration of concrete might be divided into two parts. The free lime formed in the concrete during the process of setting acted upon the linseed oil in a paint and the oil film was destroyed; so, firstly, it was necessary to eliminate this action by the use of special washes or undercoats; and, this done, the generally adopted methods of decoration and protection applied. If green concrete were allowed time to mature, carbon dioxide was absorbed, and in twelve or sixteen months the surface might be coated with a linseed oil paint with good results; but if it was desired, as is mostly the case, to paint a concrete structure soon after it was erected, it was necessary to destroy the lime, which could be done in several ways. In the first place it could be effected by the production of an insoluble lime compound without the production of another insoluble material. For that purpose oxalate of soda had been used, a material that gave an insoluble calcium oxalate and a soluble soda salt. It was stated that that method gave satisfactory results, but he presumed that very soon the soda would act upon the paint film. Acid phosphate of lime was a material which when applied combined with the lime of the surface, giving an insoluble compound. Resin, mixed with stearic acid, combined with the lime, and the stearic acid acted as a waterproofing material, but had not given satisfactory results. Soap emulsions had been also used, but when concrete surfaces were treated in that way and afterwards painted the linseed oil film disintegrated in about five or six months. He thought caseine paints might be used with great effect on concrete structures. Suitable caseine solutions applied to a concrete surface, and when dry treated with formaldehyde, gave a coating which was absolutely impermeable to water, and formed a surface on which paint could be laid. Another method was the production of innocuous lime compounds with the simultaneous formation of other insoluble bodies. The McNicol process, whereby solutions of zinc sulphate were employed, was one that had been widely used in the United States and gave very good results, superimposed paint films having lasted for two years without anything detrimental happening. Solutions of alumina sulphate and magnesium sulphate had also been applied with equally good results. With regard to coating containing pigments, mixed pigments containing free silica had been applied over concrete coatings and had not proved so satisfactory. Zinc sulphates had been formed into an emulsion, also with unsatisfactory results. He thought that the copals when made up with a small quantity of oil and diluted with turpentine would form a good waterproofing coat, and one extremely suitable for the treatment of concrete.

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[*] Courtesy of Concrete and Constructional Engineering

Decorative Treatment

Mr. Noel Heaton said he thought that the point they were more particularly interested in was how to render concrete suitable to take decoration, and that was quite a different problem from the one Mr. Cathcart had dealt with, the protection of concrete itself. It seemed to him that the protection of concrete from disintegration must be something more or less of a makeshift, shirking the difficulty. The real way to get over the difficulty was to study the problem of improving the manufacture of the concrete itself, because any treatment such as impregnation with organic materials, etc., would be really less durable than a properly made concrete. He himself had always looked upon a good concrete as a material of great durability, certainly more durable than many building stones. Linseed oil and linoleic acid were not permanent materials. He had often been called in by architects to advise them how to deal with the decay of stone work in old churches, and had frankly said that whatever was done was more or less of a palliative that the proper method was to select the stone with care so that it would not decay. It was the same with concrete.

Mr. Matt. Garbutt said up to the present the architectural finish of concrete had been neglected. The new Post Office buildings in King Edward Street were fronted by another material. Some few months ago Professor Beresford Pite, at the Concrete Institute, seemed inclined to endorse the method of the old Romans who veneered the structure with marble mosaic or slabs of marble, in fact to beg the question and not really finish the concrete itself at all. In mass concrete as opposed to ferro-concrete it was quite possible to get a finish that would be satisfactory to the eye. He thought Mr. Cathcart, when he referred to muriatic acid treatment, really meant surface picking, to expose the aggregate and thus obtain a roughened texture, which was rather pleasant.

Mr. Cathcart's Summary

Mr. Cathcart, in reply, said if it was admitted that reinforced concrete had porosity, it must be remembered that building stone with porosity had tensile strength, so had reinforced concrete tensile strength on account of its porosity. With regard to the fire in Baltimore, it would not have been so disastrous as it was if the buildings had not been faced with natural building stone, terra-cotta, and artificial building materials that calcined under the fire. With regard to the manufacture of cement, he believed the Engineers' and Architects' Societies had issued a standard specification for cement which was worked to by all Portland cement manufacturers very closely, therefore the cements used in Great Britain were mostly pure and unadulterated. But cement was not the only factor: there was the sand and aggregate. Sand had a certain amount of influence on the surface, and the variance of sands in color and shape had, of course, great influence on the porosity of a cement surface. Cinders were inert when they were properly washed and cleansed, but they were generally used for floor construction or as an insulating base for roofs. When speaking of acid treatments for exterior surfaces, he meant that the acid was used to remove the small film of mortar on the face so as to give a surface texture. The aggregate might be composed of white silica sand and small broken granite, and sometimes feldspar and carborundum, with occasionally broken brick or tiles or marble or gravel. In connection with the aggregates, much could be planned ahead for the treatment of the surface. The principal objection to exterior concrete surfaces was not that concrete was not a good surface material, but that the art of making the forms had progressed far enough. In the United States there were many systems of forming, some of which gave a surface texture of value, and as the methods of forming progressed the surface texture would undoubtedly improve. The work needed skilled labor, and when that was recognized there would not be so many failures with regard to damp walls.

With regard to the paint for concrete, any specification he might give for a paint for a concrete surface might not apply to all concrete surfaces. A complete specification for a paint for a concrete or cement required a thorough investigation of the surface itself. The problem of a specification for paint naturally had to include the time at which the paint had to be applied to the surface and the condition of the surface. Generally speaking, a paint applied to concrete would cover probably one-third less than lead paint on wood. The second coating would cover a slightly greater area.

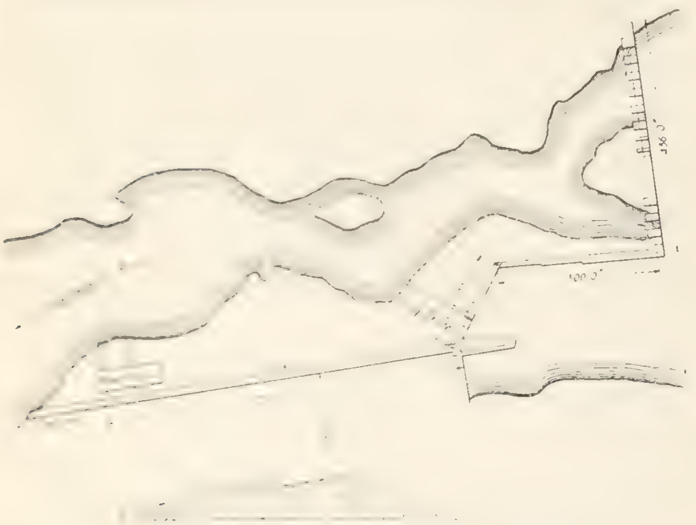
A road rammer is being tried in France to consolidate broken stone without crushing it as much as a steam roller does. As described by Mr. C. Guillet, in the "Genie Civil," it consists of a number of rams each weighing 356 lb. and having a face of 5.4 sq. ft., which are raised about 8 in. and then dropped. Four sections of road, each about a quarter of a mile long, have been consolidated in this way, and similar adjacent sections have been rolled in the usual manner. About 90 per cent. of the stones before consolidation were too large to pass through a 1.18 in. ring. After ramming 60 per cent. were still too large and after rolling only 45 per cent. were of that size.

Power Development at Sandy Falls

A Hydro-Electric Plant which Supplies Power to Several Mines in the Porcupine District—Dam, Flume and Power-House

THE Sandy Falls hydro-electric plant of the Porcupine Power Company, which was designed and built by Mr. H. D. Symmes, engineer and contractor, of Niagara Falls, Ont., is located about 380 miles north of Toronto, and has at present a capacity of 3,000 h.p. It was built to supply power to the Porcupine Gold Fields and is located forty-five miles from Kelso, the nearest railroad station, at a point where transportation difficulties were large factors in the construction problems.

After the road was cut through to the power house, 38 days were spent in preparing camps, building a temporary power plant and erecting a sawmill. When the mill was ready for service, work on the dam, flume and power house began in earnest, and within 90 days current was being delivered to a mine 6 miles from the power house. During construction work the mercury went down as low as 43 deg. below zero and the snow at times reached a depth of five feet on the level.



Map of the lay-out at the Sandy Falls Plant

The Mattagami River ranges between a minimum natural flow of 1,400 sec.-ft. and a maximum observed flow of about 15,000 sec.-ft. A rock fill timber crib dam 977 ft. long was thrown across the river at the head of rapids and from this a flume 700 ft. in length conveys the water to the power house. The dam has a maximum depth of 25 ft. and ten openings 16 x 18 ft. in size. Steel plates ½ inch in thickness are used as stop log guides. The stop logs which close the openings between the cribs are forced into place by hydraulic jacks and removed when desired by "crabs" operated by hand power.

The flume is built entirely of wood, the lumber being supplied by the sawmill erected at the site. The inside dimensions of the flume range from 16 x 13 ft. to 16 x 23 ft., the width of 16 ft. remaining constant throughout. Only in sections of 23-ft. depth are the side walls supported between roof and floor. In these sections 1½-inch wrought-iron rods are used to tie the walls together and these are put in every 24 in. at a height of 10 ft. above the floor level.

The traveller, which is shown on top of the flume in one of the photographs, was arranged to be moved along the flume as fast as the framework was in place. The central part of the traveller carried an 8 horse power motor which was used to hoist the timbers and to hold them while the spikes were being driven. The platforms projecting on either side of the flume and supported by the traveller were used as stands by the men driving the spikes. By the use of this traveller the framing of the flume was built at an average rate of a little more than 100 feet per day.

The flume sidewalks, which are built up of 4 x 10 inch timbers with 4-inch spaces between, are lined with 2-inch matched red-pine plank, and sheeted on the outside with 1-inch boards. The 4-inch air space left between the outside sheeting and the 4 x 10-in. side pieces is heated by electricity in winter to prevent freezing. To accomplish this heating four galvanized-iron telephone wires are strung in the air space on each side of the flume. These wires are arranged to be connected in various parallel and series combinations, and are heated by means of a low voltage alternating current supplied by a transformer at the power house.

The top or roof of the flume consists of 4 x 6-in. timbers placed between the verticals and fastened to them by two 9-in. spikes at each joint. One-inch sheeting is used on the roof and on this is carried a 2-in. plank walk 3 ft. wide. In the bottom of the flume 4 x 8-in. timbers are used the same as on top, three 9-in. spikes being used at each joint. The mud sills, 4 x 8 in. in section, run parallel to the centre line of the flume and are given different spacings according to the foundation which includes hardpan, clay and soft ground. The flume is continued beyond the power house and this extension serves as a waste-way which returns unused water to the river.

Two 10-ft. penstocks tap the flume at the power house to convey the water to the wheels. These penstocks are 33 ft. long and are made up of ⅜-in. riveted steel plates. The power house itself is a timber frame structure 33 ft. by 168 ft. in plan, sheeted with

Interior view of the flume under construction galvanized iron and standing upon a foundation of concrete imbedded in rock. Two pairs of 42-in. water wheels are installed which are rated at 1,600 h.p. each under a head of 34 ft. These are direct-connected to three-phase 1,500-h.p. alternators running at 214 r.p.m. and which generate at 12,500 volts. The exciters are direct-connected to the generator shafts.

Another view of the flume

The water wheels discharge into concrete draft tubes which terminate 2 ft. below water level, where they have a maximum section of 14½ by 8½ ft. These tubes were built up on forms assembled in place and supported on the ledge of rock underlying the power house. About 1,700 barrels of cement were required in this concrete work which was practically all that was used in the entire development.

Owing to the dense forest and the possibility of fire, a right-of-way 132 ft. wide has been cleared for the transmission line which is carried by two three-phase circuits on No. 0000 aluminum wire. Wood poles 35 ft. long are used and are guyed at all points where not founded in rock.

Flume and power-house

The plant is now supplying power to about ten mines in the Porcupine district, and an extension of the foundation and power house has recently been made to provide for a third unit.

The fourth C.P.R. crop bulletin, just issued, shows an average of from 95 to 100 per cent. of the seeding completed in Manitoba. In some of the northern districts of the province, however, only 90 per cent. has been finished. In Alberta and Saskatchewan there is from 95 to 100 per cent. of the seeding done. In some parts the grain is now three to four inches high.

Experience with Steel Ties under Heavy Ore Traffic

During the fall of 1908 and spring of 1909, the Duluth, Missabe & Northern Railway placed steel cross-ties in about 7½ miles of track where there is a very heavy traffic of ore trains, a one-mile stretch of double track being so equipped on the hill between the yards at Proctor and Duluth, and a 2½-mile stretch of double track across a big muskeg swamp about 50 miles north of Duluth.

The portion of the road on the hill near Duluth had been previously ballasted with crushed granite and consequently required less work in the placing of the ties than the stretch across the swamp where the ballast was gravel. The latter section had always cost a great deal to maintain during the summer on account of the nature of the soil underneath the roadbed. It was necessary to keep the track lined with men during the ore season to keep it in shape and to keep the rails spiked to line, although tie-plates were used. Owing to the shaking of the ground underneath, which set up vibration in the trains, the rails were continually spreading. It was necessary to line-spike this track every season, and some of it would have to be lined up two or three times during the summer.

The old ballast was replaced here with crushed granite, leaving the original roadbed sloping from the centre. Owing to this work having been done in the winter when there was a great deal of snow and ice, these tracks required considerable attention during the summer of 1909, but by winter, Mr. Dresser states, they were in first-class condition and during the summer of 1910 no more work was required. The section men passed over them going to and from their work, but nothing was done in either surfacing or lining during the entire summer, which was stated to be very unusual for that track. It kept in very good shape until late fall, when careful inspection showed some places slightly depressed, but this was scarcely noticeable in the running of trains. Early in the season of 1911 an extra gang went over this track and brought it to surface again. Since that time no work has been required on it.

Mr. Dresser states that with these ties, placed 18 in. centres, carrying 100-lb. rail, it is impossible for a small section crew to line and surface the track to a great extent, but that a small extra gang is needed to handle it, as it is very heavy and hard to move. But it requires so much less attention than the old track with the wooden ties and 80-lb. rail that he believes there is economy in the use of the ties, notwithstanding the difference in first cost of the steel and wood. One of the principal reasons for not placing them more extensively on the road is that the tracks run through a forest where settlers are getting out ties, which will probably be used while the supply lasts.

The ties in the two miles of track on the hill between Duluth and Proctor have required practically no attention since they were put in place, Mr. Dresser states, but the soil underneath the roadbed at this point is solid clay and has never caused trouble such as that experienced on the tracks across the big swamp.

These steel ties were put in the track with a clip and stop on the outer side of the rail and a clip only, without the stop, on the gauge side. No trouble has been experienced with broken clips or loose bolts.

The Construction of Concrete Pavements

Excellent Results obtained at Davenport, Ia.—Specifications prepared with view to Durability and Moderation in First Cost

By A. M. Compton

THE use of Portland cement concrete pavements for public streets and roadways in the city of Davenport and its environments has been almost developed during the last three years.

The first street so paved was completed in the fall of 1909 and comprised only a little over 3,000 sq. yds. In 1910 about 16,000 sq. yds. were laid. This was widely distributed and consisted of small jobs, and the type was considered as a more or less dubious experiment. By the spring of 1911, some of the paving laid to date withstood two winters and two seasons of traffic. Its condition at that time seemed to warrant the continued use of concrete. During 1911 there were laid over 18,000 sq. yds. of concrete paving in the city, and the adjoining town of Bettendorf, with a population of about 900, laid in the summer of 1911 a little over a mile of concrete paving in its main street, consisting of nearly 29,000 sq. yds. in one job.

Up to the present date, Davenport has either contracted or advertised for bids for nearly 40,000 sq. yds. of concrete street pavement to be constructed during 1912.

With one exception all the concrete paving laid in the city has so far been on residence streets, where there is no continuous heavy traffic, and has stood up under both weather and traffic conditions in a satisfactory manner.

Early Experience

The city, a number of years ago, paved several rather steep hills with beveled vitrified brick with a telford macadam strip 10 ft. wide in the center. These macadam strips washed badly and were in an impassable condition within a few years. We have recently replaced these center strips with a one-course concrete pavement from 4 to 6 in. thick and corrugated with a "hit or miss" tamper. The grade of these hills varies from 9½ to 12 per cent., and in one instance the paving receives very heavy traffic. It has been noticed that teamsters generally prefer to drive on the concrete center strip rather than on the brick sides. The only signs of failure so far have developed at the transverse expansion joints which were left unprotected save for a sand filler. In fact none of our concrete pavements so far have shown any failure under traffic save at the expansion joints.

In 1909-10 the concrete pavement was laid under specifications briefly as follows: A 5-in. base of 1:3:5 concrete with a wearing surface of 1:1 sand mortar was corrugated transversely with tooled grooves about 8 in. apart. The mineral aggregate was river sand and 1½ in. crushed limestone. A transverse expansion joint filled with pitch was required every 50 ft. In 1909 the price on the only piece laid was $1.25 per square yard; in 1910 the price varied from $1.27 to $1.37 per square yard. The same year a number of residence alleys were paved with one course of 1:3:5 concrete 6 in. thick and rough finished, at an average price of $1.11 per square yard. During the fall and winter of 1910-11 the writer noticed that almost without exception these blocks of paving 50 ft. long and 30 ft. wide had developed irregular contraction cracks. While these cracks were negligible as to size they were without question a failure and detrimental to the life of the pavement.

With the idea of a general bettering of the work and in an ndeavor to do so without materially increasing the cost, our specifications were changed before the season of 1911 to call for a 5-in. base of 1:3:5 concrete with a 2-in. wearing surface of 1 part cement to 2 parts sand, a 2-in. transverse expansion joint every 25 ft., and a 1-in. longitudinal expansion joint along either curb and a 1⅛-in. contraction joint midway between the transverse expansion joints. All joints have tool rounded edges and are filled flush with asphalt. This divided the work into blocks of 12½ by 30 ft. and so far has practically eliminated all contraction cracks. The concrete pavement under this specification was laid in 1911 for $1.25 to $1.30 per square yard.

During the season the city also laid several thousand yards of concrete pavement consisting of a single course 6 in. thick of 1:2½:4 concrete with the mortar flushed to the surface, floated, and either broom-finished or corrugated as the grade of the street required. This was laid under contract at a cost of 93c. to $1.00 per square yard.

Reinforced Concrete Pavement

During this same season our department was required to pave a street the sub-soil of which was decidedly treacherous, consisting largely of sawmill refuse, such as sawdust, chips, bark, etc., filled above the natural surface of the ground to a depth of from 6 to 12 ft. and saturated with river water. Both railroad and street railway tracks which parallel and adjoin this street settle from 18 to 24 ins. annually where they cross this fill. As this street would be subject to heavy and high speed traffic, in the writer's opinion, a flexible type of pavement, such as the various forms of macadam, would neither withstand the traffic without constant repair nor be in the least self-supporting over what seemed almost certain excessive and unequal settlement.

A good brick or asphalt pavement with concrete base was discussed, but owing to the writer's experience with concrete base failures due to trench settlement, and owing to the excessive cost to the city for this type of pavement, because of adjoining park property, these types were abandoned. It was finally decided to use reinforced concrete pavement to consist of 7 in. of 1:3:5 concrete with ½ per cent. steel mesh reinforcement placed near the lower surface of the concrete. It was thought that this type would more successfully withstand the settlement and still come within the requirements of a very moderate first cost. It was planned with the idea of placing either a brick or an asphalt wearing surface upon it if, in the future, the surface should disintegrate or ravel badly under traffic.

The successful contractor laid this pavement in the summer of 1911, using a sufficient amount of

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[*] Commissioner of Public Works, Davenport, Ia.

American Steel & Wire Company's wire fencing as reinforcement, for 93c. per square yard. During and immediately after its construction we experienced several weeks of excessive and continual rainfall, leaving the sub-grade in a jelly-like condition. The curbing settled badly but so far no signs of failure in the pavement have developed, not even contraction cracks, though during its life so far it has experienced a range of temperature of 113 deg. As to the surface wearing qualities of 1:3:5 concrete, another year of the heavy traffic that this street receives should tell the tale.

Present Practice

Owing to the very general demand of property owners this season by petition, and otherwise, for concrete paving, the writer has again changed his specifications in the effort to obtain if possible, the best and most substantial concrete pavement compatible with a moderate first cost. The present specifications call for a five-inch base of 1:3:5 concrete upon which is laid a wearing surface, not less than 1½ in. in thickness at any point, consisting of 1 part cement, 1 part of sand and 1 part ¼ to ½-in. granite chips; transverse expansion joints consisting of creosoted long leaf yellow pine blocks 1 in. in thickness placed with the grain vertical 20 ft. apart, and the same longitudinal joints along the curbs as before specified. The prices received so far this season upon the pavement to be built under this specification have varied from $1.00 to $1.17 per square yard.

In Davenport we have approximately 1,500,000 sq. yd. of pavement, of which only 38,000 yd. is concrete, so that it will be seen that this type of paving is in its infancy. It has demonstrated its advantages particularly in certain localities desiring or requiring street improvements in order to develop, and where abutting property is of such a type and character that to lay either brick or asphalt would not only be a hardship to the property owners but also would burden the city with a large excess of cost.

Based on our experience so far the first cost of our concrete paving is only about 65 per cent. of the cost of brick paving and about 59 per cent. of the cost of asphalt paving. It is the writer's opinion, that this type of paving will give satisfactory service in such localities for at least ten years, and at the end of that time be in such shape that either an asphalt or brick wearing surface may be laid directly upon the concrete paving as a base. We are designing our curb height and crown of street so as to permit so doing in the future. In ten years the difference in first cost plus accrued interest will much more than pay for a first-class asphalt wearing surface.

One of the main objections to this type of pavement in the past has been the fact that it was a slow type during construction, but the Bettendorf paving work laid last fall demonstrated that that type of concrete paving consisting of a single course of 1:2½:4 concrete, 6 in. thick, could be satisfactorily laid at the rate of from 1200 to 1800 sq. yd. per day. This work in Bettendorf furnishes one of the best examples of the availability of concrete pavement where no other permanent type is possible. The City Council of Bettendorf required a paved street not less than 40 ft. between curbs, while nearly all the adjoining property would show a valuation of not over $1200 per front foot. Under the Iowa State law this valuation would limit assessment to a little under $300 per foot, which rendered absolutely impossible the use of either brick or asphalt.

The writer prepared plans and specifications calling for bids on 29,000 sq. yd. of concrete paving to be mixed 1:2½:4, with mortar flushed to the surface with a bar temper, floated and broomed; expansion and contraction joints to be placed dividing the work into blocks 12½ x 20 ft., and all to be filled with an asphalt filler. There were also 18,000 cu. yd. of excavating, 11,000 lin. ft. of 18-in. concrete curb, 12,000 lin. ft. of 12-in. concrete curb. This latter was placed around a 10-ft. center boulevard strip which was left for the purpose of receiving a probable street railway line. The successful bidder on this work took the contract at 85 cents per square yard, 30 cents per cubic yard for excavation, 18 and 20 cents per foot respectively for the curbing. The ground for this work was first broken in the middle of September and the pavement was completed and open to traffic in the middle of December.

During the past season, several thousand square yards of concrete roadways and drives in private grounds have been constructed under the supervision of local engineers. Both the single course type and the two course type have been used with equally satisfactory results.

Objections to Pavement

One feature of this work has been the coloring of the concrete to prevent the objectionable sun glare from the dead white surface; this feature is particularly noticable when the roadway is directly edged with grass and trees. From ½ to 1 lb. of lampblack per barrel of cement was used, and the resulting slate-colored or light gray effect is most pleasing to the eye.

One of the most objectionable feaures in the use of concrete street paving is the length of time that must elapse after completion before traffic may be permitted thereon. We never open a new concrete street until at least ten days have passed after the time of placing the last concrete, and in some instances of unfavorable weather conditions, we have required 30 days.

In the writer's opinion, the expansion joint is the weak point of this type; as soon as actual test has proven some scheme for protecting expansion joints successfully, then is concrete paving a success.

The writer particularly desires to emphasize the fact that proper inspection is essential and that all cement used in the construction of concrete paving should be properly tested by the city before its use in the street. Since there is being laid more and more of this type the city owes to its taxpayers the protection given by at least a complete 24-hour test on all cement used. We all appreciate what would be the result of the use of only one carload of defective cement in a concrete pavement and it is the duty of all engineers in charge of such work to obtain such tests if they are at all possible.

Decreasing the width of a highway bridge to reduce vibration has been partially carried out in the case of the Calvert Street bridge in Washington, D.C. Excessive vibration had been caused by traffic on the sidewalks, which are supported on cantilever brackets and to reduce this the railing in the side of the bridge was moved in 5 ft. with the intention of doing likewise with the south railing. This was opposed by the traction company on the ground that narrowing the bridge was illegal and their stand was sustained by the court. At present pedestrians are using the roadway with the understanding that it is at their own risk.

Proposed Y.M.C.A., Galt, Ont.

THE Galt Y.M.C.A. Building, plans of which are reproduced herewith, was designed by Messrs. Shattuck & Hussey, of Chicago. The building is typical for structures of this size and class and as such it will doubtless be of interest. There will be three storeys and basement. On the first floor will be located the social rooms for the men and boys, and also the gymnasium. On the second floor there will be educational rooms, seven dormitories and the upper portion of the gymnasium. On the third floor will be located nineteen dormitories. The accommodation in the basement includes locker rooms, bowling alleys, shower rooms, swimming pool and boiler room. The exterior of the building will be of brick, with stone trimmings, and the floors of frame construction. The approximate cost of the work is $45,000, and the contractor is Mr. Faulkner, of Brantford.

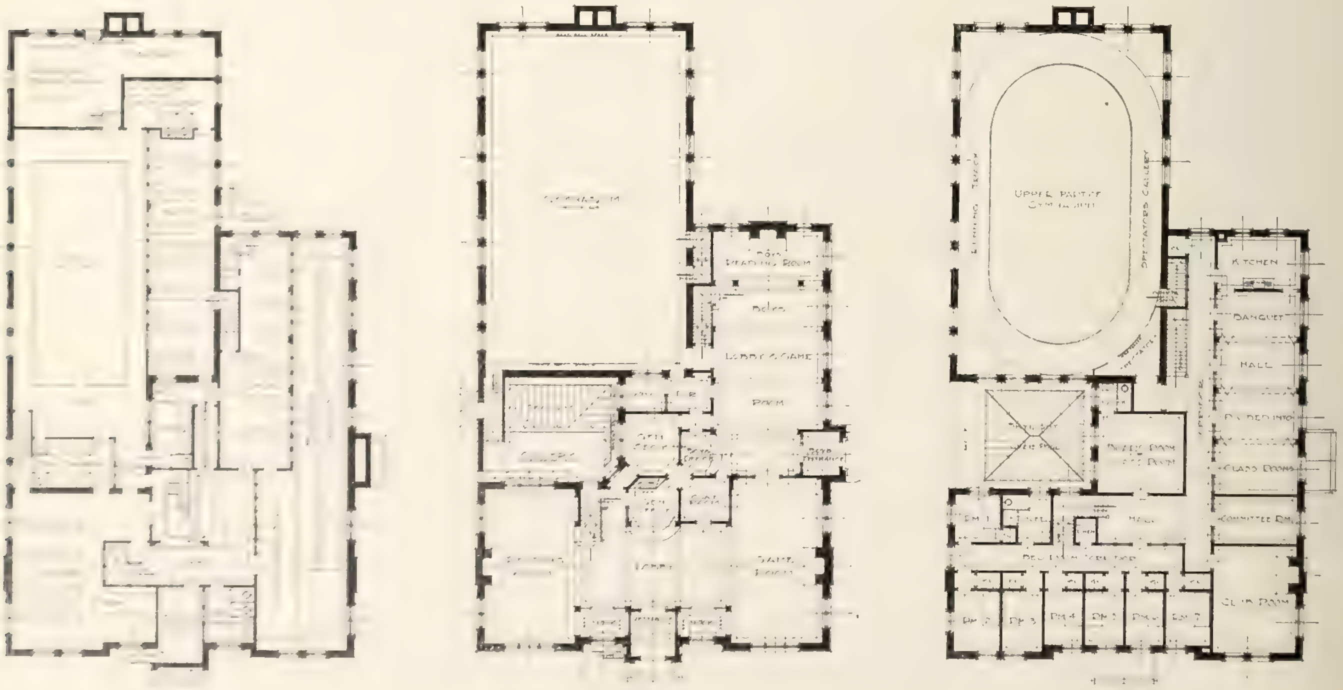
Proposed Y.M.C.A., Galt, Ont.
Architects: Shattuck & Hussey, Chicago
Contractor: Mr. J. Faulkner, Brantford, Ont.

Brick and Tile Output in the U.S.

A preliminary statement of the general results of the thirteenth census relative to establishments engaged in the manufacture of brick and tile has been issued by the Bureau of the Census, Department of Commerce and Labor, Washington. The capital invested as reported in 1909 was $174,673,000, a gain of $54,716,000, or 46 per cent. over $119,957,000 in 1904. The average capital per establishment was approximately $41,000 in 1909 and $26,000 in 1904. The value of products was $92,776,000 in 1909 and $71,152,000 in 1904, an increase of $21,624,000, or 30 per cent. The average per establishment was approximately $22,000 in 1909 and $15,000 in 1904. The cost of materials used was $23,736,000 in 1909, as against $16,317,000 in 1904, an increase of $7,419,000, or 45 per cent. The value added by manufacture was $69,040,000 in 1909 and $54,835,000 in 1904, an increase of $14,205,000, or 26 per cent.

The "unsinkable" Titanic is an affinity of the so-called "fireproof" buildings, says "Brick and Clay Record." The inadequacy of the supply of lifeboats compares with the lack of properly protected exits of public and office buildings and the methods of construction for stopping the spread of fires. The law does not require that steamships be fireproof or that steamships should even carry a sufficient quantity of lifeboats. Neither does the law require that you should build a fireproof building, and it probably will take more Iroquois fires and Titanic disasters before the people will fully awaken to the importance of making laws providing for the construction and equipment of buildings and boats to insure the life of human beings who have a right to be protected by the laws of our land.

Floor Plans, Y.M.C.A. Building, Galt, Ont.



Basement First Floor Second Floor

Proposed Uniform Contract for Alberta

WE reproduce herewith the form of contract adopted by the Alberta Association of Architects and the Alberta Builders' Exchanges, and recommended for general use throughout the province. An interesting comparison may be made between this form and the standard contract adopted recently at Montreal. The latter in its amended form was published in our issue of May 1.

Form of Contract

This Agreement, made in duplicate the...............day of ....in the year one thousand nine hundred and........ by and between ....party of the first part (hereinafter designated the Contractor), and................ ....party of the second part (hereinafter designated the Owner).

Witnesseth, that the Contractor and the Owner in the consideration of the fulfilment of the agreements herein respectively made by the other, agree with each other as follows:

Article I. The Contractor under the direction and to the satisfaction of .... Architect acting for the purposes of this contract as agent of the Owner, shall and will provide all the materials and perform all the work mentioned in the specifications and shown on the drawings and details prepared by the said Architect and in accordance therewith, for the .... which drawings and specifications are identified by the signatures and initials of the parties hereto and which materials and work are herein called "the works."

Article II. The architect shall furnish to the Contractor such further drawings or explanations as may be necessary to detail and illustrate the work to be done, and the Contractor shall conform to the same as part of this contract so far as they may be consistent with the original drawings and specifications referred to an identified, as provided in Article I.

All figured or written dimensions on drawings or specifications to supersede the measurement by scale.

The Specifications and drawings are intended to cooperate, so that any works shown in the drawings and not mentioned in the specifications, or vice versa, are to be executed the same as if mentioned in the specifications and set forth in the drawings, to the true intent and meaning of the said drawings and specifications.

It is mutually understood and agreed that all drawings and specifications are and shall remain the property of the Architect and shall be returnable to him before the final certificate is issued.

Article III. No alteration shall be made in the works shown or described by the drawings and specifications, except upon a written order of the Architect and when so made the value of the work added or omitted shall be computed by the Architect at latest within one week after he is requested in writing by either party so to do and the amount so ascertained shall be added to or deducted from the contract price. In case of dissent from such computation by either party hereto or of failure of the Architect to make such computation, the valuation of the work added or omitted shall be referred to arbitration as hereinafter mentioned.

Article IV. All work and material as delivered on the premises, to form part of the works, are to be considered the property of the Owner and not to be removed without his consent; but the Contractor shall have the right to remove all surplus material after he has completed the works herein contracted for.

Article V. The Contractor shall provide sufficient and proper facilities at all times for the inspection of the work by the Owner, Architect or their authorized representative. He shall, within twenty-four hours after receiving verbal or written notice from the Architect to that effect, proceed to remove from the ground or buildings all materials condemned by him, whether worked or unworked, and to take down all portions of the work which the Architect shall by like verbal or written notice condemn as unsound or improper or as in any way failing to conform to the drawings and specifications.

Article VI. Should the Contractor at any time refuse or neglect to supply a sufficiency of properly skilled workmen, or of materials of the proper quality, or fail in any respect to prosecute the works with promptness and diligence, or fail in the performance of ony of the agreements herein contained, such refusal, neglect or failure being certified by the Architect; the Owner shall be at liberty (after six days' written notice to the Contractor) to provide any such labor or materials, and to deduct the cost thereof from any money then due or thereafter to become due to the Contractor under this contract; and if the Architect, with sufficient justification, shall certify that such refusal, neglect or failure is sufficient ground for such action, the Owner shall also be at liberty to terminate the employment of the Contractor for the said works and to enter upon the premises and take possession, for the purpose of completing the works comprehended under this contract, of all materials, tools and appliances thereon, and to employ any other person or persons to finish the works and to provide the materials therefor; and in case of such discontinuance of the employment of the Contractor he shall not be entitled to receive any further payment under this contract until the works shall be wholly finished unless the Owner is unreasonably dilatory in completing said works, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expense incurred by the Owner in finishing the work such excess shall be paid by the Owner to the Contractor, but if such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, either for furnishing materials or for finishing the works and any damage incurred through such default, shall be audited and certified by the Architect but appeal from decision may be made to arbitration, as herein provided.

Article VII. The Contractor shall complete the several portions, and the whole of the work comprehended in this agreement by and at the time or times hereinafter stated

and shall deliver up the works to the Owner in perfect repair, clean and in good condition when complete. The Contractor shall not sub-let the works or any part thereof without the consent in writing of the Architect.

Article VIII. And should the Contractor fail to finish the said work on or before the time agreed upon he shall pay or cause to be paid to the said Owner in the way of liquidated damages the sum of $ per diem for each and every day thereafter the said work remains incomplete. And the Owner shall pay to the Contractor a like amount as a bonus for each and every day the works are completed before said date.

Article IX. Should the Contractor be obstructed or delayed in the prosecution or completion of the works by reason of the act, neglect, delay or default of the Owner or of the Architect or of any other contractor or person employed by the Owner upon the works, or of the [illegible] of such other contractor, or by reason of extra work being ordered to be done, or by reason of inclemency of the weather, or by fire, lightning, earthquake or cyclone, or by reason of delay in obtaining materials caused by strikes or delays in transit or shortage of labor through no default or negligence of the Contractor, or by reason of the abandonment of the works by the employees through no fault of the Contractor (provided that unwillingness on the part of the Contractor to pay in excess of union wages shall not be deemed default on his part), then the time herein fixed for the completion of the works shall be extended for a period equivalent to the time lost by reason of any or all of the causes aforesaid, but no such allowance shall be made if, in consequence of the Contractor's omission to present a claim therefor to the Architect within 36 hours after the occurrence of said delay, the Architect or arbitrators are unable to make a fair estimate of the extension of time the Contractor shall receive hereunder. The duration of such extension shall be certified to by the Architect subject to appeal to arbitration as heinafter provided.

Article X. The Owner agrees to provide all labor and materials not included in this contract and the further detailed drawings and explanations mentioned in Article II in such manner as not to delay the material progress of the works, and in the event of unreasonable failure so to do, thereby causing loss to the Contractor, agrees that he will reimburse the Contractor for such loss; and the Contractor agrees that if he shall unreasonably delay the material progress of the work so as to cause any damage for which the Owner shall become liable, then he shall make good to the Owner any such damage. The amount of loss or damage to either party hereto shall in every case be fixed and determined by the Architect, subject to arbitration as hereinafter provided.

Article XI. It is hereby mutually agreed between the parties hereto that the sum to be paid by the Owner to the Contractor for said work and materials mentioned in Article I, shall be .... $.......... subject to additions and deductions as hereinbefore provided and that such sum shall be paid in current funds by the owner to the Contractor in instalments as the works progress, such instalments to represent....per cent. of the amount of the work done and materials supplied on the ground and the Architect shall, as accurately as possible, issue estimates thereof promptly every

The final payment shall be made within days after this Contract is substantially fulfilled.

All payments shall be made upon written certificates of the Architect to the effect that such payments have become due. Before the issue of any certificate the Contractor shall, if required, produce to the Architect a clearance from the various men and workmen, together with a statutory declaration of the names of the persons supplying materials in the employ of the Contractor or any sub-contractor upon the said works in the course of the employment of such workmen or employee, provided that if for reasons not within the Contractors control, he cannot then complete the same, the Architect shall forthwith deduct the actual value of the incomplete portions together with fifty per cent., thereon (of the propriety of which deduction and the amount thereof the Architect shall be the judge subject to arbitration as herein provided) from the contract price and issue a final certificate that the works are completed and the last payment due and indicating the amount thereof.

If at any time there shall be evidence of any lien or claim in respect of the works, for which, if established, the Owner or the said premises might become liable, and which is chargeable to the Contractor, the Owner shall have the right to retain out of any payment then due or thereafter to become due an amount reasonably sufficient to completely indemnity himself against such lien or claim. Should there prove to be any such claim in respect of the works after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging such claim in consequence of the Contractor's default.

In the event of the Contractor being required to make and making a deposit with the Owner for the proper performance of this contract the same shall bear interest at the rate of five per cent. (5%) per annum from the date of this receipt by the Owner to the date of repayment to the Contractor, and shall, with such interest be repaid to the Contractor, as soon as the Contractor has substantially fulfilled this contract.

Article XII. No certificate given or payment made under this contract except the final certificate or final payment shall be conclusive of the fulfilment of this contract by the Contractor, either wholly or in part, and no payment shall be construed to be such an acceptance of defective work or improper materials as would entitle the Contractor to payment therefor.

Article XIII. The Owner shall during the progress of the work maintain full insurance on the works in his own name and in the name of the Contractor, against loss or damage by fire and shall at all times give the Contractor full information respecting the same. The policies shall cover all work incorporated in the building, and all materials for the same in or about the premises, and shall be made payable to the parties hereto, as their interest may appear. Any insurance carried by the Owner in his own name shall be deemed to be in satisfaction of this covenant even it not expressed to be payable to the Contractor, and the Owner shall in such case be deemed to be a trustee thereof for the Contractor to the extent of anything owing to the Contractor in respect of this contract. Provided, that if the Owner makes default in maintaining sufficient insurance, the Contractor may insure the works in respect of his interest therein and the premiums paid by the Contractor therefor shall be forthwith payable by the Owner to the Contractor.

Article XIV. Any arbitration herein provided for shall be as follows: The Contractor and Owner shall each appoint one arbitrator and such arbitrators may appoint a third. The decision of any two of the three arbitrators shall be final and binding. The arbitration shall be conducted in accordance with the provisions of the Alberta Arbitration Act. An award under the provisions of this article may be made a rule or judgment of the Supreme Court of Alberta or of any court hereafter constituted exercising the jurisdiction now exercised by said Supreme Court.

Article XV. The covenants herein contained shall apply to and be binding on the parties hereto and their respective heirs, executors, administrators and assigns, and each of them.

Article XVI. In case the terms of this contract conflict with the specifications, the provisions of this contract shall govern.

Article XVII. The Owner shall have the right to employ other person or persons to do certain works not in this contract and the Contractor is to afford facilities for the carrying out of such work, insofar as it does not increase the cost of the works to the Contractor.

In witness whereof the said parties to these presents have hereunto set their hands and seals, the day and year first above written.

In the Presence of ....(Seal)
..........................(Seal)
..........................(Seal)
..........................(Seal)

From the Law Courts

Contractor's Access to Premises.—In giving judgment in the case of Henry Oram vs. Dame M. L. Senez, at Montreal, Mr. Justice Greenshields held that a proprietor who takes possession of newly built or repaired premises cannot indefinitely refuse to admit a contractor for the purpose of remedying defects in the workmanship or material of work done; nor can he retain the balance due the contractor until such time as he himself sees fit to give him access to the premises. The judge therefore condemned Dame M. L. Senez to pay $104.50 to Henry Oram. The latter had done plaster work for the defendant, but after the completion of the job certain defects in the materials, it was said, became apparent. In the meantime defendant had taken possession of the premises, and repeatedly refused Oram access thereto to remedy matters.

Action to Enforce Lien.—An action to enforce a mechanics' lien. The words of sec. 17 of the Mechanics' Lien Act, "No assignment by the contractor . . . of any moneys due in respect of the contract shall be valid as against any lien given by this Act," were held not to operate so as to prevent payments made by the owner to creditors of the contractor, under an arrangement between the owner and the contractor, from being effective as payments on account of the contract-price, in the ascertainment of the amount due from the owner to the contractor, upon which alone the lien of material-men attaches.

If the arrangement had been one for payment in the future; but, once the arrangement was acted upon and payments were made in pursuance of it, the assignment (if the arrangement amounted to an assignment) ceased to be of importance, and the payments must be regarded as payments to the contractor—no notice in writing having been given by the plaintiffs—and the owner was protected to the amount of these payments. The costs of the plaintiffs were equitably adjusted, in view of all the circumstances, including the circumstance that the plaintiffs might have proceeded by way of originating summons, instead of by action.

Building Contract: Completion or Non-Completion.—In an action by a contractor against building owners to recover a balance alleged to be due for work done under a building contract and for extras, and upon a counterclaim by the defendants for damage done to their goods by the plaintiff, and for delay, Mr. Justice Beck, who tried the action in Edmonton, held that the question of completion or non-completion, in any particular case, must depend upon the terms of the contract and the facts and circumstances of the particular case; and, where there is honesty and a bona fide intention to complete, there is completion if the contract is completed in all essential and material respects, and there exist only slight imperfections in the work or slight deviations from the specifications, which can be easily cured and corrected at an expense trifling as compared with the amount of the contract-price; and in this case, there was completion in that sense—the contract-price being about $20,000, the plaintiff having deposited with the defendants the sum of $1,000 by way of security, designed to cover trifling imperfections, and the owner being entitled to retain 20 per cent. of the contract-price until completion.

He also held, that, if there was non-completion, the architect having, under the authority of a clause in the agreement, elected to give a notice to the plaintiff calling his attention to certain parts of the work remaining incomplete, requiring him to complete them within three days, and stating that, failing compliance, the contract would be cancelled and the work completed by the architect, had, by taking advantage, on behalf of the defendants, of the benefits of this clause, conferred upon the plaintiff the corresponding benefits, viz., that the work must be paid for by the defendants with a deduction of the cost of such labor and materials as was incurred in completing the contract; and, an election having once been made, neither the owners nor the architect could withdraw.

The only reference to a written certificate of the architect was in a clause of the contract relating to payments, in these words: "The remaining 20 per cent. on the contract-price to be paid 33 days after the works are entirely completed to the satisfaction of the architect and accepted by him, provided that, in each case where payment is demanded, a certificate shall be obtained from and signed by the architect in charge to the effect that he considers the payments properly due."

Apparently under this, a written certificate was not a condition precedent to recovery by the contractor; and, if a certificate was required, the architect could be forced, by mandamus or otherwise, to execute one.

But the question of the necessity for a final certificate did not really arise, because the defendants took over the completion of the contract, and were liable to pay the contract-price with the proper deduction. Even where the contract provides that a final certificate shall be a condition precedent to recovery by the contractor, the condition becomes ineffective where the employer interferes with the architect, either before or in the giving of the certificate.

Mr. Justice Beck also held, upon the evidence:

(1) That the architect would, if he had been left to exercise his own independent judgment, have certified to the final completion of the building, with a deduction for defects or imperfections to the amount of 150, and that he refrained from doing so, and refused to do so, because he was instructed by the defendants and their solicitors not to do so, and thus, if a certificate was necessary, it was dispensed with.

(2) That the architect did eventually give an effective certificate.

(3) That the plaintiff was entitled to recover the balance of the contract-price, with a small deduction for imperfections or defects in the work; and was also entitled, upon the evidence, to recover for certain extras both within and without the contract.

Upon the counter-claim he held, that the defendants were entitled to $300 for damage to goods by rain, through the negligence of the plaintiff; but were not entitled to any further damages for loss of or injury to goods.

The contract provided for the payment by the plaintiff of $20 a day for each day's delay after the time fixed for completion, "the said amount to be deducted from the amount of consideration for this contract as for liquidated damages, and not by way of penalty . . . provided, however, that, should the contractor be delayed by strikes of any trade, or from any other cause which he cannot reasonably be expected to control, then the architect shall give the contractor such extension of time as, in his (the architect's) opinion, is fair and just":—

It was a question whether these sums of $20 a day could be recovered in the action, or whether the only remedy was to deduct them from the amounts owing by the owners to the contractor upon the final ascertainment. But it was held, that, in any event, the architect, by his absolute refusal to deal with the question of damages, which necessarily involved the question of allowance for delays, abdicated his quasi-judicial office; and, therefore, the ascertainment of the amount of the damages involving the allowance for delays was for the Court.

It was also held that, once the owner has seen fit to take possession of a building, although this may have no bearing on the question of completion or non-completion, it prevents the owner from claiming so-called liquidated [illegible] for its completion, and, upon the evidence, having regard to the time or times when possession was taken, the days of delay should be fixed at 26 and allowed for at $20 a day.

Injury to Workman; Negligence Established.—Appeal to the Court of Appeal by the plaintiff from the judgment of Chief Justice Mathers in favor of the defendants, in an action brought at Winnipeg by the plaintiff for damages for injuries sustained while employed in the defendants' works, by reason of the negligence of the defendants' or the plaintiff's fellow servants. The plaintiff was doing work as a carpenter for the defendants upon the roof of a building. A joist upon which he was working in the performance of his duty broke in the middle and he was thrown to the ground and seriously injured. Chief Justice Mathers held that the method of placing the joists adopted by the defendants was a reasonably safe method of procedure, that there was no negligence on their part, and dismissed the action.

The Court held that the defendants were negligent in not furnishing scaffolding or ladders to enable the plaintiff to reach safely the work assigned to him and in not providing a reasonable system of inspection of the joists, when it was known to the defendants for what purposes they were to be used. The judgment was set aside and verdict rendered for the plaintiff for $7,000 damages, with costs of appeal and trial.

Responsibility for Collapse.—The Court of Review, Montreal, on May 22 gave judgment in the case of J. M. Wilson vs. H. G. Vogel & Company. It involved the responsibility of a contractor for the collapse of a water tank erected on a building, and the ruling of the lower court in the case with plaintiffs and defendants in warranty and sub-warranty, was modified in certain details, whilst in the main it was sustained. The lower court had condemned the defendants to pay $9,590.68 damages on the grounds that the collapse was due to the weakness and insufficiency of the walls of the building, and that it was incumbent upon the defendants, as contractors, to assure themselves of this condition, before attempting to erect the superstructure and tank. The Court of Review, whilst maintaining the damage award, holds that the collapse was due to a defect in the construction of the steel work supporting the tank. For this, the defendants were also responsible by reason of the fact that they had undertaken to carry out the work on the understanding that they would look after all details connected therewith. The H. M. Vogel Company, on being sued, called Mr. Charles M. Gardiner as defendant in warranty, on the ground that he was entrusted with the actual work of erecting the tank and substructure, and Mr. Gardiner, in turn, entered action in sub-warranty against the Locomotive & Machine Company, as it was the latter concern that had been entrusted with the steel work.

Encroachment on Adjoining Property in Foundation Work.—Questions of an unusual character, and of considerable interest to contractors, arise out of the action Dubreuil vs. Labelle, which came before Mr. Justice Beaudin at Montreal. The defendant erected a skyscraper at the corner of City Hall avenue and St. Catherine street, and in constructing the substructure sank several piers twelve feet below the surface of the land, these piers varying from four feet square to ten feet by fourteen feet. They were sunk in such a way that the centres, whereon rested the steel work supports, were flush with the dividing line between the defendant's and plaintiff's properties. Thus, one-half of each pier rested on the neighboring property. Defendant contends that, in order to secure the necessary foundation for the steel work supports, he had to sink the piers so that the supports would rest in the centre. Hence he had to abut on plaintiff's land. Moreover, it was contended that no injury had been done plaintiff, as he could utilize the piers if he decided to build.

Plaintiff denied that it was necessary for the piers to be placed in the manner described, and he pointed to other large buildings, the substructure of which had been carried out without encroaching on neighboring land. It might cost more to build in that way, but that was defendant's lookout. Plaintiff further maintained that he could not make use of the piers, and for the very reason that, as defendant alleged, rendered it necessary for him to sink the piers as he did. If defendant had to have his framework supports in the centre of the piers, the same rule would apply to plaintiff, and there could not be two centres to any of the piers. Further the plaintiff sues to be reimbursed for every square foot of his land occupied by the encroaching piers, and estimates that the damage he has suffered under all heads totals $40,000.

Canadian Railroad Development

Tenders will be called immediately for the construction of ten steel bridges along the line of the Canadian Northern Railway on the Fraser and Main Thompson rivers in British Columbia. The plans were designed by Messrs. Waddell & Harrington, of Kansas City. The cost of the structures is estimated at $1,000,000.

Good progress has been made in the preliminary work of the new Welland Canal, according to reports of engineers at the Department of Railways and Canals. New borings are being made and the department will be in possession of definite information as to the character of the new route before the tenders are called for next fall.

Work on the C. N. R. tunnel in Montreal is to be pushed forward as rapidly as possible. The plans show that the elevated tracks from Lagauchetiere street to the river front will consist of viaducts thirty feet wide, having a clearance of eighteen feet from the crown of the arch to the pavement. The viaducts will be constructed of reinforced concrete.

Representatives of St. Thomas, Aylmer, Yarmouth and Malahide, have agreed to guarantee the bonds of the London & Erie Railway Transportation Company of London, Ont., for the extension of the road from St. Thomas to Aylmer to the extent of $10,000 a mile. The company asked for $20,000. If the offer is accepted the proportion that each manufacturer is to assume will be decided.

On June 1st the C.N.R. will open its new hotel at Brandon, Man., "The Prince Albert." The hotel has a frontage on Princess street of 120 feet by 100 feet on Ninth avenue. South of the hotel and adjoining it is the station, 190 feet long by 36 feet wide, two storeys and a basement. The station is in the Doric style of architecture and built of Tyndall stone and Roman brick. The hotel is 82 feet high and contains six storeys and basement.

The first step towards the expenditure of over two million dollars by the C.P.R. at Vancouver has commenced by the excavation for the new depot. This depot, which itself will probably entail a cost of nearly a million dollars, will occupy a site just east of the present station. The contract has already been awarded to the Westinghouse-Church-Kerr Construction Company, who have sublet the excavation work to a firm in Vancouver. The lawn will give way to a rectangular hollow nearly fifty feet below the level of Cordova street, and the earth taken out will be used for filling up operations along the C.P.R. waterfront property. The building was originally designed as a structure of six storeys in all, four of which were to be above Cordova street level, and the area taking up about half the site available there. But some additions and changes have been made to the plans of the depot upon the recommendation of the western officials. It is expected that the old depot will be torn down some time next year.

Through Mr. H. R. Safford, chief engineer, the Grand Trunk Railway Company have asked the Montreal City Council to contribute an additional sum, estimated at $500,000, over and above the $2,000,000 authorized to be paid towards the elevation of the Grand Trunk tracks into the city. The extra money is asked for on the ground of increased cost of material and labor and additional improvements ordered by the Railway Commission. Thirty streets will have to be provided with subways.

The C.P.R. is doing its utmost to rush the steel along the Lethbridge-Weyburn line this summer in order to have laid at least fifty miles of steel to carry the big crop which is anticipated this year. It is estimated that Southern Alberta alone will supply thirty million bushels and every effort is being made to get as much steel down as possible east of Stirling. If the weather conditions are satisfactory 110 miles will be graded . This new line will open a great stretch of fertile country, part of which is thickly populated. With the railway built, and the irrigation system in use, there will be an unprecedented rush to fill up the country east of Lethbridge next year.

Immediate commencement of work on the extension of the E. & N. Railway, now owned by the C.P.R., from McBride Junction to Courtenay, is announced by Superintendent Beasley. A contract has been let for grading the first ten miles of the line. The tenders also include the necessary bridge work over the first ten miles, and it has been awarded to Culliton Bros., of Spokane. The line between McBride Junction and Courtenay, sixty miles, has been surveyed for some time and the awarding of the present contract is in accordance with the company's announcement that construction work would commence this spring.

Between forty and fifty miles of heavy steel will be laid on the Canadian Pacific line between Castlegar and the boundary during the present year, according to the plans under the appropriation for the Nelson district. A new steel bridge will be constructed between Cascade and Grand Forks. Three bridges not completed last year are still occupying the attention of the engineering department, one being on the Granby spur, another at Greenwood and another at Cascade. A large fill has yet to be completed between Tunnel and Coryell, and the hydraulic fill at Porcupine will be advanced another stage during the present summer.

The Canadian Northern Railway have given orders for a large quantity of machinery in connection with the construction of the Mount Royal tunnel. The drills to be used will be worked by compressed air, the compressors being run by electricity, which will be supplied by a local company to two power stations situated at each end of the proposed tunnel, where it will be stepped down to the desired voltage Five electrical locomotives are being purchased for use in the construction of the tunnel. In addition to the central station in the Model City, it has been decided to have two sub-stations at that end of the line.

Mr. Louis W. Hill, President of the Great Northern Railway, says that his company will spend several million dollars upon the development of terminal facilities in Vancouver and vicinity within the next few years. The greater part of the expenditure will be upon improvements at False Creek and upon the erection of a large union depot. Mr. L. Hill is the son of the great railway builder, J. J. Hill, and arrived in Vancouver last week, in company with a number of other prominent officials of the Great Northern Railway. Besides Mr. Hill the party include Mr. C. R. Grey, of Portland, Ore., President of the Seattle, Portland & Spokane Railway; Mr. H. J. Jackson, general traffic manager of the G.N.R., and Mr. M. J. Costello, assistant general traffic manager.

From St. John, N.B., comes word that contracts have been let for the construction of the greater portion of the St. John Valley Railway, and for the Gibson and Minto Railway. Large crews of men will be set at work at once at various points, and the work will be pushed forward with energy, creating a very active demand for labor and supplies. With regard to the development of the oil shales in Albert County, Senator Domville stated recently that the company which is capitalized at $5,000,000 would have the work well under way before the end of the summer, and he stated further that it was their intention to establish a large plant for the manufacture of cement. Several cement propositions have been discussed in St. John recently and there is a general feeling that at least one large plant will be established, because of the demand there will be for this material in connection with the great public works which will be under construction for the next few years.

According to an announcement by Mr. C. V. Cummings, General Manager of the Northern Construction Co., Winnipeg, Man., about 3,000 men and 1,000 teams are to be engaged on the new Canadian Northern Brazeau branch. Eighty miles of grading remains to be finished and this is being carried on with all speed. The complete section is from Rocky Mountain House to the coalfields, where there are at work to-day 600 men and 200 teams. Within a few weeks' time, 1,000 men will be employed on this branch alone. The work will be completed before the close of construction for the season of 1912. On the Onoway Peace River branch the company will complete 100 miles of new line this season through to Athabasca Crossing, while on the Strathcona-Calgary line the C.P.R. line to Pakan, the construction is being expedited. On the Goose Lake line, 110 miles of new grade will be laid this year, closing the remaining gap and enabling the Canadian Northern railway to haul out over this route during the coming fall the product of the grain harvest of the year.

Building Activity Maintained at Winnipeg

In spite of the vast amount of building going on in Winnipeg at the present time, building permits issued show no sign of diminution. Robinson's department store have started work on the foundations of their addition, which will almost double their present immense floor space. The Manitoba Cold Storage Company will erect a new building during the present summer, doubling the capacity of their plant. The structure will cost $250,000 and will have a frontage of 195 feet and will be 160 feet in depth. It will be seven storeys high, with a complete basement. The edifice will be the largest of its kind in the Dominion. All the plans will be of the most modern type. The construction will be of reinforced concrete with cork insulation. Provision will be made for a complete system of mechanical refrigeration. The storage space of the building will be 1,000,000 cubic feet, or double the present capacity of the plant. A four-storey warehouse for Turner & Walker, manufacturers' agents and warehousemen, is to be erected at the southwest corner of Ellen street and Henry avenue, at a cost of $65,000.

Excellent progress is being made on the construction of the C.P.R. office building at the corner of King and Yonge streets, Toronto. It is of interest to note that the North-western Architectural Terra Cotta for this work is being furnished through the Black Building Supply Company, Toronto.

Personal Mention

Mr. [illegible] M. Lay, City Engineer of Kamloops, B.C., has resigned.

Mr. Clemens Moogk has been appointed Town Engineer of Waterloo, Ont.

Mr. Andrew Beckwith is the new General Manager of the Provincial Steel Company, Limited, Cobourg, Ont.

Mr. Grover Keith has been appointed resident engineer at Fredericton, N.B., for the St. John & Quebec Railway.

Mr. James Lowe, one of Montreal's oldest contractors, died on May 22, at his home in Cadieux street, after three years' illness.

Toronto's New Commissioner of Works

Mr. Roland C. Harris, the former Property and Street Commissioner, has been given charge of the Works Department of the City of Toronto at a salary of $8,000. Mr. Harris entered the services of the city as a junior clerk and worked up through the various stages until he became chief clerk in the property department, after which his promotion was rapid. He is only 37 years of age but he has grown up in the municipal life of Toronto and his appointment has been received with general satisfaction. Mr. Harris will have full charge of the administration of the Works and the Waterworks Departments. He will also retain control of the Street Cleaning Department.

Mr. R. C. Harris, who has been appointed Commissioner of Works for Toronto

At Vancouver, B.C., last week, there occurred the death of Mr. E. Wooldridge, builder and contractor, formerly of Palmerston, Ont.

Mr. J. B. Chalies has been appointed superintendent of the new water power branch of the Department of the Interior at Ottawa.

Mr. Charles Ruddock has been appointed general construction engineer in charge of the Dominion Coal Company's work at Glace Bay, N.S.

The John Galt Engineering Company, of Winnipeg, have been appointed engineers for the installation of a waterworks and sewerage system, costing approximately $150,000, at Bassano, Alta.

Mr. Morris Wilson, the English expert on dry dock construction, arrived at Ottawa last week and will act for the Dominion Government in arranging preliminaries for the proposed Quebec dry dock.

Messrs. Heap & Partners, Limited, of Birmingham, Eng., represented in Montreal by Mr. C. E. Gausden, were the successful tenderers for a $10,000 contract for water pipes at St. Lambert, Que., last week.

Mr. Morris F. G. Wilson, of the English firm of Code, Son & Matthews, dry dock experts, has arrived in Ottawa. He has been engaged by the Federal Government to advise on the selection of a site for a dry-dock in the vicinity of Quebec.

Mr. George B. Hull, M. Am. Soc. C. E., Assistant Engineer, Department of Public Works, who had charge of the surveys for and construction of the Quinze dam of the Upper Ottawa River reservoir system, has been appointed District Engineer for the Department of Public Works in British Columbia, with headquarters at Prince Rupert.

Mr. J. W. Collins, President, and Mr. D. C. Dennis, engineer of construction of the Great Northern Construction Company of New York, were in Winnipeg last week laying a proposition before the city council for the installation of a high pressure sewerage system. They are credited with having offered to finance the undertaking and to carry out the whole work in six months.

Mr. Beaudry Leman, one of the Commissioners appointed to draw up plans for placing electrical wires in Montreal in underground conduits, has resigned, owing to pressure of private business. Mr. Beaudry Leman, who represented the city on the Commission, in a letter to the controllers protested against unjust criticism of the delay in proceeding with the scheme. There have been many difficulties in the way, and the work has not proceeded as fast as some aldermen believe it ought to have done.

The Russell Shale Bricks, Limited, a new company, have appointed Mr. J. W. Ball, manager. A large plant is being erected near the town of Russell, Ont. The following compose the board of directors: Mr. George F. Hodgins, hawville, president; Mr. A. W. Fraser, Ottawa, vice-president; Messrs. Paul Galibert, T. A. Trenholme and Francis Hyde, Montreal; Mr. J. D. McPhail, Russell; Mr. Wm. Graham, Mr. T. M. Mulligan, Ottawa, and Mr. James Donaldson, Dalmeny. Messrs. Trenholme and Galibert were at one time directors of the Laprairie Brick Co., P. Q.

Mr. E. J. Chamberlain, the former Vice-President of the Grand Trunk Pacific Railway, and since the death of Mr. C. M. Hays, Acting-President, has been chosen President of the Grand Trunk Railway, succeeding Mr. Hays in the management of all the Grand Trunk lines. Mr. Chamberlain was born in Lancaster, N.H., and entered into railway work in 1871 as a timekeeper in the car shops of the Central Vermont R.R., at St. Albans, Vt. He then served as a clerk until 1877 when he was made private secretary to the

General Manager, a position he held for seven years. In 1884 he mas made Superintendent of the Ogdensburg & Lake Champlain R.R. and Central Vermont Line steamers running between Ogdensburg and Chicago, Ill. From 1886 to 1905 he was General Manager of the Canada Atlantic Ry., which became a subsidiary of the Grand Trunk Railway. Since 1905 he has been an executive officer of the Grand Trunk and Grand Trunk Pacific Railways.

Well Known Superintendent Enters the Lists

The advent of Mr. Alfred Richley, of Toronto, into the Canadian contracting field is an event which cannot pass unnoticed. Mr. Richley is best known here for his connection with the Toronto filtration plant as its superintendent of construction, but in the United States his associations are wider and the work with which he has been identified more important. Mr. Richley has spent the greater part of his life on the other side of the border. He was born in England some forty years ago and at an early age went to the United States, where he soon made connections with practical building work. Across the line his acquaintance with men and matters has been extended and varied, and his experiences, practical and otherwise, are interesting—when he knows you well enough to tell you them. In the more important work he has mentioned at times we recollect the Buffalo & Susquehanna railroad through New York state; a 50-mile stretch of the Erie & Jersey railroad; a large ore dock at Buffalo for the Lackawanna steel plant, and the grade crossings at Buffalo.

Mr. Alfred Richley, Toronto

Mr. Richley's first contract in the Canadian field is for a dam and power house at Walkerton, Ont., for the Walkerton Light & Power Company. May this be the first of a long string of successful and remunerative undertakings!

The occasion is opportune to mention the fact that it was to Mr. Richley that we were indebted for much of the progress material published in connection with the Toronto filtration plant. Mr. Richley is an expert photographer and when he was not actually superintending operations at Toronto Island he was "taking" various portions of the work, as a result of which upon its completion he had a complete record of the construction from start to finish. Mr. Richley very generously gave us free access to this record and many of the pictures were published in our issue of January 17 last, in which appeared a detailed summary of the work.

Mr. Richley is not readily communicative, but he takes a keen interest in the various technical journals and is not unwilling to give others the benefit of his experience. He has our best wishes.

Construction News and Notes

Messrs. Jago & Harris are making good progress on the Williams building on Yonge street, Toronto. This building is to be faced with Northwestern Architectural Terra Cotta, which has already been manufactured and will be supplied through the Black Building Supply Company.

Mr. A. Jamieson, elevator engineer, of the Board of Trade, Montreal, has been instructed by the Quebec Harbor Commissioners to prepare plans for the building of a million bushel capacity elevator to be erected on the Louise Embankment, with provision for an extra million bushel storage.

The proposed Mount Royal Hotel, which it was planned to build on the corner of St. Catherine and Peel streets, Montreal, has been abandoned. The idea was to construct one of the finest hotels in Canada, but some difficulties occurred in the financial end, and the company have decided to sell the land.

Building work at Edmonton is continuing apace. In one week the permits issued totalled nearly $600,000. The total was swelled by a permit for a six-storey reinforced concrete warehouse, estimated to cost $250,000, for Messrs. Revillon Bros. The contract for the Revillon building has been awarded to Messrs. McDiarmid & Company, Winnipeg.

At the time of writing there is a prospect of a strike of the bricklayers and masons of Alberta and Saskatchewan. According to word received from Lethbridge, Alta., demand will be made for an increase in pay to 75c. an hour. Officials of the union state that a refusal on the part of the employers will probably mean a general cessation of work.

Messrs. Doyle, Thomas & Christensen, Limited, builders and contractors of Calgary, have obtained from the Calgary School Board a contract for a second school building, estimated to cost $148,000. This building will have concrete foundations, stone walls and reinforced concrete floors. The work now being carried out for the Board by the above firm aggregates in value $300,000.

Press reports state that Sir Sandford Fleming and Mr. Joseph Irvine, both of whom have been prominent in cement affairs recently, are identified with a new cement merger capitalized at $10,000,000, whose operations will be carried out by a chain of plants stretching across the continent. An authoritative and detailed statement concerning this merger will be published in a later issue.

The Executive Committee of the Washington Good Roads Association have brought in recommendations looking to an expenditure of ten million dollars upon the construction of three trunk lines, having a total length of 1,000 miles. The city of Vancouver will be the terminus of the Pacific Highway, three hundred and fifty miles in length, from Blaine through Bellingham, Seattle and Tacoma.

The Canada Birck Company recently offered to the public $200,000 7 per cent. cumulative preferred stock and $300,000 of common. The authorized capital will be $500,000 of preferred stock and the same of common. The company's plant at St. Lambert, P.Q., is now turning out 10,000 bricks a day, and another one, which will be in operation in Outremont in August, will have a capacity of 80,000 bricks a day.

An attractive apartment house building has been erected at the corner of [illegible] and [illegible] streets, Toronto, for Dr. E. N. Driver. The architects for the structure were

Messrs. [illegible] & Henderson and the contractors, Messrs. J. J. Dissette & Company. The new building has a frontage of [illegible] feet and is five storeys high. It is of brick construction with stone trimmings and solid concrete foundations. There are [illegible] bedroom suites, replete with the most modern conveniences.

The B. C. Provincial Government have made a grant of [illegible] towards the construction of the New Westminster road. The grant was made upon the representation of the city of Vancouver, the municipalities of South Vancouver and Burnaby, the Vancouver Automobile Club and the Canadian Highways Association. The work involves the expenditure of several hundred thousand dollars and will require two years to complete. The entire distance to be paved is about seven miles.

Two companies and some private owners have offered to cede to the Montreal Council 1,094,950 square feet of land for the construction of two boulevards along the banks of the city aqueduct to Lachine. Other owners are holding out for big prices, but power will probably be taken to expropriate their land. The main idea of the scheme is to construct a double boulevard each over 100 feet wide, which will be one of the finest driveways on the continent. A very effective system of lighting at night is proposed.

From the builder's standpoint, Weyburn, Sask., is one of the busiest towns in Western Canada. During the first five months of 1912 permits for buildings were issued to the value of upwards of $300,000. The C. P. R. will build a new passenger depot and freight sheds at Weyburn, while plans have just been completed by Mr. T. Halley, of Winnipeg, for the new municipal hospital. A number of manufacturing concerns are making considerable extensions and negotiations are in progress for several new industries.

On May 30 the members of the York Highway Commission had a conference with the Toronto Board of Control to discuss the matter of obtaining an additional appropriation of $60,000 for road work throughout the county. This grant is to supplement the $300,000 already received for the improvement of roads leading into Toronto. The extra expense is due to the adoption of plans for more permanent work. Another meeting will be held in the near future when it is hoped that a favorable decision will be reached.

At Winnipeg, work was commenced last week on a four-mile asphalt paving contract to a point on Portage avenue beyond Sturgeon Creek. The contract for the foundation work has been sublet by the Bitulithic and Contracting Company (which has the main contract) to the Guilbault Company, of St. Boniface. The pavement, which is to be 24 feet wide, will be laid from the city limits to the Assiniboia municipal hall. The entire work is to be rushed to completion and when finished will make Portage Avenue one of the finest automobile roads in Western Canada.

The town of Verdun, P.Q., has passed a new code of building by-laws, and appointed an inspector to see that it is carried out. All dwellings and shop property and the like must be constructed of brick, stone or concrete or wood with outer case of brick, stone or concrete, and no outbuildings will be allowed unless constructed of the same material or of wood cased with a non-combustible material. Some of the other by-laws are very stringent, and it is provided that in every apartment house, tenement or flat house built in series or rows they shall be constructed at intervals of 50 feet. The code occupies 100 typewritten pages.

Among the new incorporations we note the following: Meaford Brick Co., Toronto, capital $500,000; Intercities Quarry Co., Ltd., Port Arthur, $500,000; Quebec & St. John Construction Co., Ltd., Montreal, $1,000,000; Charing Cross Industrial Co., Ltd., Montreal (roads, bridges, etc.), $1,000,000; United Contract Co., Ltd., Montreal, $250,000; Purdy & Henderson Co., Ltd., Vancouver (engineers, architects and builders), $200,000; Montreal House Construction Co., Ltd., Montreal, $200,000; Dominion Construction Co., Ltd., Toronto, $150,000; Big Four Brick Co., Ltd., Toronto, $150,000; York Sandstone Brick Co., Ltd., Toronto, $80,000; Sherbrooke Construction Co., Ltd., Sherbrooke, Que., $100,000.

The Fire and Light Committee of the Toronto City Council have approved the scale of fees to be paid in future for the examination of plans, specifications, and the issue of building permits. This work and the issue of permits hitherto has been free. The scale is as follows: For plans of buildings, etc., not exceeding $500 value, $1; over $500, but not exceeding $1,000, $2; over $1,000, but not exceeding $10,000, $2 for first $1,000 and 75c. for each additional $1,000; over $10,000, $8.75 for first $1,000 and 50c. for each additional $1.000 up to $20,000; over $20,000, the fee for $20,000 plus 40c. per $1,000 up to $100,000; over $100,000, the same fee as the last, plus 30c. for each additional $1,000. The fees will be payable as soon as the scale is confirmed by Council and the by-law passed.

The Alsip Brick & Supply Company has been incorporated under the provincial laws of Alberta and will establish a $100,000 brick plant in the city of Edmonton. The president of the concern, Mr. W. P. Alsip, has for many years conducted at Winnipeg the largest brick supply concern in the prairie provinces. The General Manager of the plant at Edmonton will be Mr. J. A. Bullman, who for the last seven years has been manager of the Silicate Brick Company, of Ottawa. The directorate includes Mr. E. F. Hutchings and Dr. Herbert, of Winnipeg; and Mr. Wm. Laidlaw and Mr. F. A. Clarry, of Toronto. The Secretary-Treasurer is Mr. D. D. Wood. The new manager, Mr. Bullman, is enthusiastic as to the development of Edmonton. He is of opinion that the city is about to enter upon a period of unprecedented development, and the opportunity of entering the field now in order to supply the demand for brick in northern Alberta he regards as a golden one.

Forthcoming Conventions

The Union of Canadian Municipalities will meet at Windsor, Ont., August 27-29. Mr. W. D. Lighthall, K.C., is the honorary secretary-treasurer.

The Canadian Electrical Association will hold their meeting at Ottawa, June 19-21. The Secretary is Mr. T. S. Young, 220 King street west, Toronto.

The Ontario Municipal Association will hold their annual convention in the Toronto City Hall, June 18-19. Mr. K. W. McKay, of St. Thomas, Ont., is the secretary-treasurer.

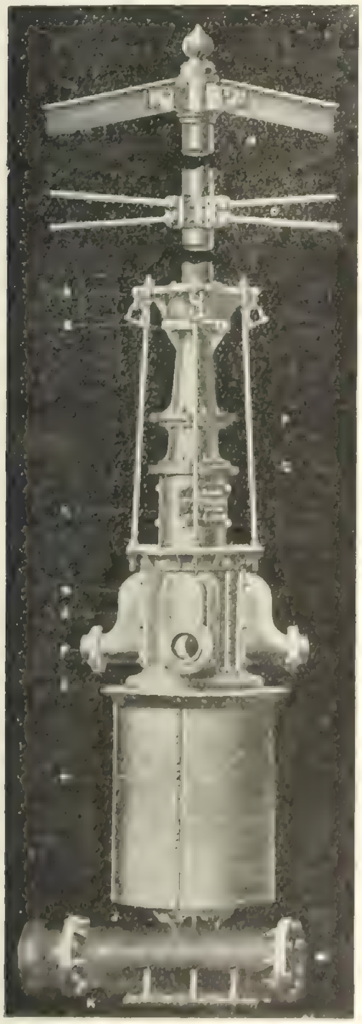
The annual convention of the Society for the Promotion of Engineering Education will be held at Boston, Mass., June 26-28. The Secretary is Mr. H. H. Norris, of Cornell University, Ithaca, N.Y.

The Canadian Public Health Association will hold their second annual meeting in Toronto, September 16-18. Mr. T. Aird Murray, consulting engineer, Toronto, is the convener for the engineering section.

The second annual convention of the Canadian Highway Association, of which Mr. P. W. Luce, of New Westminster, B.C., is the secretary, will be held October or November next. At the conclusion of the meeting the members will proceed to Ottawa to urge the objects of the association upon the Federal Government at Ottawa.

A Revolving Sewage Sprinkler

TO those of our readers who are directly interested in the science of sewage disposal, we believe that the accompanying illustration will be of interest. This shows one of the specialties of Messrs. Adams-Hydraulics, Limited, of York and London, England, one of the leading manufacturers of this class of goods. This particular machine is their patent "Adamic" Cresset Revolving Sewage Sprinkler for use on percolating filters and is the outcome of their knowledge gained through equipping upwards of five thousand percolating schemes in Europe. Its chief feature is the airlock seal between the stationary and the revolving parts, which replaces the old-fashioned packing joint, or mercury seal, used on other types of revolving sprinklers. The packing joint causes much friction and the spreaders on which it is used require from three to four feet head driving power; as regards the mercury, the cost of this alone renders the appliance fitted therewith a very extravagant article. Upon this airlock seal hangs the whole crux of Messrs. Adams' invention, as they have, on this account, been able to almost eliminate friction, and so allow their "Cresset" sprinkler to work with as small a head as 6-in, and therewith deliver a variation in volume of from 1 to 3.



N—Malleable iron junction to carry roof girders.

O—Roof stay junction.

A—Revolving Cross head containing ballraces and with connections for carrying Revolving Body D by means of Rods Q.
B—C. I. Column extension socketted so as to receive the W. I. main roof support column.
P—Removable double flange piece to allow for the dropping of B. so as to gain access to ballrace.
C—Heavy C. I. Main column bases.

E—Patent Arm Feeds.

F—Connection to arms.

G—Drum in which patent frictionless air joint is concealed.

H—Fixed Containing Tank.

J—Connection to which liquid is supplied to the distributor.
L—Liquid inlet.
M—Connection for outlet pipe.
K—[illegible]

"Adamic" Cresset Revolving Sewage Sprinkler

This machine has been put on the market in consequence of the British Local Government Board speaking of the necessity for being able to get a greater variation of flow through revolving distributors. Unless that is done it means that an unlooked-for addition to the volume of sewage makes the erection of other filters necessary. Up to the present, the only way to get anything like a variation in volume delivered has been to use overflow arms, through which the sewage is only delivered in time of greater flow, but this means that during the normal flow, the sewage is being delivered and is effective as a driving power through two arms only, the remaining two being carried round as a dead load on the distributor, with the result that a greater head is required to do the work. In the 1912 Cresset Adamic this difficulty is overcome by the use of the special attachment which connects the four arms to the distributor body.

These are all on the same level and the tank effluent passes thus into all the flow. At times of maximum flow the head increases within the distributor body and the balance of the liquid overflows through rectangular weirs into the taper arm connection. In this way the distributor will deliver a variation in volume normally from one to four under a head of fifteen inches. Where a greater variation is desired, this is arranged by a modification of the above.

This new design in combination with the company's airlock frictionless self-charging joint (between the central syphon column and the revolving body) means:—

(1) A less head required and thus a greater depth available for the filter, and less diameter required consequently.

(2) A variation between the minimum and maximum volume delivered sixty per cent greater than has hitherto been possible.

For countries where climatic conditions render the roofing over of the filter beds a necessity, Messrs. Adams' sprinkler again presents a unique feature. It will be seen from the illustration that they have continued the stationary centre column to a height sufficient to cause it to act as the main "tent pole" of the roof. In any other type of machine it is necessary to form the roof in a dome shape, carried only from the sides of the filter, which is of course a very expensive form, but by gaining the centre support above referred to, the cost of the roof is materially reduced; furthermore, is much more substantial when finished.

In Canada, sprinklers built on this system are in course of completion at North Toronto, Lethbridge and Regina. The two schemes first-named have been supplied to the order of Mr. T. Aird Murray, consulting engineer, of Toronto. We are informed that Messrs. Adams have other similar orders in hand.

This firm are also the patentees of the well-known Adams' automatic flushing syphon for shallow sewers. Some hundreds of these are sold abroad annually, as also are their patent "Autaram" sewage lift, with which it is now possible to raise sewage from a low level area by power gained from using the fall of sewage from a high level area in the same town. By this system the cost of outside power is eliminated, and as will be seen, after the first cost, the installation is self-supporting. It is interesting to note that the English Local Government Board grant their maximum loan on this patent, namely thirty years.

Messrs. Adams have recently issued a concise foreign edition of their catalogue, copies of which may be obtained from their Canadian agent, Mr. F. Hankin, 201 Coristine Building, Montreal. During the present year one of their principals, Mr. C. H. Adams, is making an extended tour in Canada and will be pleased to call on engineers who have schemes pending.

Mr. F. A. Creighton, City Engineer of Prince Albert, Sask., has submitted a report upon [illegible] and sewerage [illegible] proposed at [illegible]. As an alternative to certain extensions which would provide 250,000 gallons of water daily, Mr. Creighton suggested a plan of securing a water supply from the South Saskatchewan River nine miles east of the town, which would furnish [illegible]

Publications Received

Sewage Disposal; by Geo. W. Fuller, consulting engineer and sanitary expert, New York City; published by the McGraw-Hill Book Company, 239 West 39th Street, New York. . . . . . Mr. Fuller is too well known in the Canadian contracting field to require any introduction at our hands. In this work he has prepared a valuable compendium of information pertaining to the subject which cannot fail to stand as a reference for some years. The book is based upon the intimate experience of twenty-five years' association with this branch of sanitary work and its aim is to record the more important recent developments in the field of sewage disposal. The book is divided into four parts, the first of which is devoted to a description of the composition of sewage and the behaviour of bacterial and biochemical processes in the decomposition of sewage. The importance of oxygen and deoxygenation, not only as a means of measuring the strength of sewage but in relation to proper conditions of the flow of sewage through collecting systems and various disposal devices, is discussed rather fully. The second part is devoted to a recital of American experience in the disposal of sewage by dilution in inland streams, lakes, tidal estuaries and oceans. The third part of this book deals with what have been generally called preparatory arrangements for the treatment of sewage. Screening, settling tanks, septic tanks, chemical precipitation tanks, electrolytic treatment and strainers are discussed in much detail, particularly septicization in two-storey tanks. Resumes as to their present standing are given for each device. The fourth part deals with filtration matters with a view to recording present practice. The closing pages of the book are devoted to aeration, sterilization and ozonization processes as they are now understood, with a few explanations as to institutional and residential plants, and a final comparative summary of general costs and efficiencies.

Chain Belt, the house organ of the Chain Belt Company, Milwaukee, Wis., is a breezy and attractive monthly publication which is mailed free to contractors and others interested in concrete construction. While this periodical contains items of particular interest to users of the company's products there will be found therein many informative and helpful articles relating to the practical phases of contracting. For instance, in the May number there is an article descriptive of the foundation work for the Northwestern Life Insurance Building in Milwaukee—an interesting example of expediency and efficiency in concrete work; the same number contains some practical directions dealing with the measurement of crushed stone, while one of the features of the April issue is a description of a spouting system for placing concrete, as employed by the J. C. Mardis Company at Des Moines. Canadian contractors have had plenty of opportunity to become familiar with the name of the Chain Belt Company and they cannot do better than to keep in touch with the company through the medium of this excellent publication.

Looking across the lower floor of a large warehouse or factory before the merchandise or machinery is in place, the casual observer is impressed with the forest-like effect of the large number of columns which are required to support the weight of the upper floors with their load of stock or machinery. If concrete columns are used the layman is impressed with their massiveness, and the manufacturer or merchant with the large amount of valuable floor space which they occupy. A type of column which has come into use recently and which is claimed to combine, in some degree, the compactness of steel columns with the unity of structure of concrete columns consists of a skeleton column of structural steel shapes filled with concrete and covered with a shell of concrete for fireproofing purposes. Whether in such a column the steel column and concrete filling act together to give a strong, stiff column has been a matter of some doubt. Bulletin No. 56 of the Engineering Experiment Station of the University of Illinois, "Tests of Columns, An Investigation of the Value of Concrete as Reinforcement for Structural Steel Columns," by Arthur N. Talbot and Arthur R. Lord, gives an account of tests made on the strength of such columns in the Laboratory of Applied Mechanics of the University of Illinois. Not only was the breaking load for columns of various lengths determined experimentally, but the action of both the steel column and the concrete filling was studied in detail. For the technical reader is given a thorough discussion of the full strength of such columns and of the nature of the action of the concrete and of the steel; for the non-technical reader this bulletin describes the make-up of such columns and shows that if properly made they are safe, efficient and compact

The Little Wonder concrete mixer is described in a booklet issued by the Waterloo Cement Machinery Corporation, of Waterloo, Iowa. This mixer is designed upon similar lines to the "Polygon" tilting batch mixer which is claimed to be the most thorough and rapid mixer ever designed. The titlting drum principle applied to the small mixer has produced in the "Little Wonder" a marvel of simplicity and efficiency. In regard to the matter of economy the makers claim that with this machine six men will mix and place 25 cubic yards of concrete a day and that when the men become familiar with the work they can increase the capacity to from 30 to 35 cubic yards a day. It is pointed out that the "Little Wonder" is also very valuable on large work, there being on every big building contract daily use for an easily portable, handy little mixer to swing into action on some detail of work to which it is too expensive to move a big machine. We believe that our readers will find it both interesting and profitable to obtain a copy of this catalogue.

Catalogue No. 8 descriptive of the steam pumps manufactured by the Smart-Turner Machine Co., Ltd., is a publication that cannot fail to be of value to engineers and contractors. The catalogue covers only the designs and sizes ordinarily called for, the compilers having given the capacities of pumps at suitable and not at maximum speeds. The company also manufacture a large number of special pumps with different combinations and to suit the varied conditions under which they are required to operate. In addition to the above, catalogue No. 7, descriptive of the company's power pumps, may be obtained upon request.

The Pennsylvania Structural Slate Company, Inc., Easton, Pa., have issued an excellent catalogue descriptive of their sanitary plumbers' slate. The company's own designs and patterns are shown in this catalogue and the products illustrated represent the last word in non-absorbent, sanitary and practically indestructible fixtures of the kind. The company manufacture urinals, closet stalls, shower bath stalls and slate lavatories for schools, factories and public buildings.

In a statement regarding the progress of the widening of the aqueduct and of the new filtration plant, Mr. Janin, the chief engineer of Montreal, says that the purpose of enlarging the aqueduct ditch into something like a river is to get hydraulic power for running the turbines which will operate the pumps. It is this work which is nearing completion. This summer another contract will be awarded for widening the aqueduct still more. By the second contract Mr. Janin explained it is proposed to build concrete walls for the open aqueduct all the way to Lachine.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

High River, Alta.

Engineering supplies, cost $125,000. Mayor, R. A. Wallace; Secretary, G. E. Mack, Engineers, Chipman & Powers, Mail Building, Toronto, Ont. J. A. Broley & Co., Fernie, B. C., awarded contract for ditching, sewer pipe, water pipe and water tower, approximate price for ditching, $26,000. Tenders called shortly for pumping machinery, pump house and disposal works.

Ottawa, Ont.

Concrete sidewalks for McKellar Townsite Co., 279 Bank street; 3,000 lin. feet. Tenders received by W. H. Tate, managing director, 279 Bank street, Ottawa, where specifications are to be seen.

St. Thomas, Ont.

Waterworks. Engineer, M. H. Baker. The Canadian Boving Co. are installing pump at pumping station. One centrifugal pump, capacity 3,000,000 gals in 24 hours, electric driven by 60 B.h.p. Lancashire motors, 2200 volts; one centrifugal pump, capacity 5,000,000 gals. in 24 hours, driven by Alley & McLellan engine 100 h.p.

Brick pavement, Ross street Mr. M. H. Baker, City Engineer. Under construction by Board of Works.

Waterworks. Mr. M. H. Baker, engr., has been instructed to place estimates for 2,500 ft. of 18-in. pipe line from waterworks to city before board on June 5th.

Vernon, B.C.

Sewers, cost $7,160. City Clerk, D. G. Tate. Work under consideration of the City Council.

Waterworks. Tenders will be received until June 10th. Plans at office of engineer. City Clerk, D. G. Tate.

CONTRACTS AWARDED

Dorval, Que.

Concrete sidewalks. Engineer, V. H. Dupont, 62 St. James street, Montreal. Successful tenderer, Alphonse Laplante, Lachine, for 1,500 lin. ft.

Railroads, Bridges and Wharves

Toronto, Ont.

Addition to retaining walls; concrete construction, 120 x 5. Tenders called shortly for extension to south end of present walls in West Toronto by Chairman, Board of Control, City Hall.

Tps. of Sullivan and Arran, Ont.

Two steel bridges, Bruce County. 1 span 40 ft., the other 60 ft. 16 ft. roadway, concrete floor, and also for four concrete abutments on pile foundations. Plans at offices of Joseph Grant, Reeve of Tara, and August Kleger, Reeve of Sullivan, Marmion P. O. Duplicate tenders received by John Rutherford, Co. Clerk Grey, Owen Sound, and P. O. Malcolmson, Co. Clerk Bruce, Southampton, until June 6th. James Warren, Engineer, Walkerton.

Yarmouth Tp.

Concrete wall, etc., Barnums Gulley, cost $3,000, Warden, Alex. Anderson, St. Thomas. Tenders called shortly for a concrete retaining wall and flume. Plans at office of Engineers, J. A. Bell & Son, St. Thomas.

York County, Ont.

Concrete arch bridge, three miles from Thornhill, Yonge street. Plans at office of Engineer, Frank Barber, 57 Adelaide street east, who will receive tenders till June 6th.

CONTRACTS AWARDED

County of Wellington, Ont.

Bridge, cost $8,371. Warden, Mr. Gray, Clifford, Ont. Engineer, A. W. Connor, 36 Toronto street, Toronto. Contractors for cement construction, J. Langdan, Kenilworth, $5,104. Jacob Jalm, Mildmay, $1,392. Contractor for steel work, Stratford Bridge Company, Stratford, $1,875.

Public Buildings, Churches, Schools, etc.

Calgary, Alta.

Court house, cost $185,000, 7th avenue west, for Alberta Provincial Government. Architect, Mr. Blakey, Edmonton, Alta. Two storeys, 173 x 81, stone and reinforced concrete construction. Work started.

Hamilton, Ont.

Underground public comfort station. The City Council has issued instructions to A. W. Peene, architect, 2 King street west, to reduce plans for above work from $24,500 to $18,500 and call new tenders.

Maisonneuve, Que.

Post office, Ontario street. Sealed tenders received by secretary, R. C. Desrochers, until June 17th. Plans at office of architect, C. A. Reeves, 58 St. James street.

McLeod, Alta.

Oddfellows Temple and stores, cost $35,000, 3rd ave. Two storeys, 99 x 66, brick and tile construction. Plans ready.

Montreal, Que.

Alterations to hall, 1240 St. Catherine street, for J. Jackson, 366 Grosvenor avenue, Westmount. Architects, Dufort & Decary, LaPatrie Bldg. 36 ft. high. 68 x 100, brick. Work started.

Customs examining warehouse, cost $2,000,000, McGill, Youville and Normand, for Dominion Government, Ottawa. Ten storeys, 150 x 550. Foundation started.

Red Deer, Alta.

Exhibition building, cost $10,000. Architect, C. A. J. Sharman, Red Deer. President, Agricultural Society, W. E. Lord. Frame and cement. Tenders open.

Parish hall, cost $8,000, for Anglican Church. Chairman building committee, Rev. Moore. Architect, C. A. J. Sharman. Cement and brick. Tenders received until June 11th.

School, cost $6,000. M. A. Munro, Secretary School Board. Architect, C. A. J. Sharman. Plans in preparation.

Renfrew, Ont.

Addition to Royal Victoria Hospital, cost $7,000, N.S. Bonnechere River. Architect, Jno. McNicoll. President, Rev. Mr. Quartermain. Secretary, Jno. Grale. 43 ft. x 44 ft., general hospital equipment required. Plans under consideration.

St. Catharines, Ont.

Sunday school for St. Georges Church. Architect, A. E. Nicholson, 46 Queen St. Two storeys, 80 x 48, Tenders formerly closed May 31st, extended to June 10. School furniture required.

Sarnia, Ont.

Exhibition building. Architect, R. W. Fawcett. Concrete and brick construction. Tenders received until June 8th.

Sudbury, Ont.

Fire Hall, cost $20,000. Mayor, J. G. Henry. Plans ready; an alarm system also to be installed, cost $6,000.

CONTRACTS AWARDED

Medicine Hat, Alta.

School, cost $18,000, for Separate School Board. Architect, W. T. Williams. General contractor, H. T. W. Forster. Two storeys and basement, brick and stone construction.

Montreal, Que.

Alterations to picture theatre, cost $6,000, for A. Bourget, 1276 Notre Dame W. Architect, L. R. Mont Briant, 230 St. Andre street. General contractor, H. Demers, 47 Labelle street. 36 ft. high, 45 x 110, brick.

Ottawa, Ont.

Additions, cost $3,000, to Rideau Maternity Hospital, Rideau street. Architect, C. J. Burritt, Sparks Chambers. Mason, Holbrook & Son. Carpenters, McDermott & Tyndall. Brick, concrete and stone.

St. Catharines, Ont.

Roman Catholic Church and school, Weston Hill. Arch., J. L. Moore, Tor. Gen. contractor, H. P. Nichol & Son.

Queen street, St. Catharines. 50 x 40. [illegible] construction.

Saskatoon, Sask.
School, cost $27,800. Secretary, W. P. Bates. Architect, D. Webster. General contractors, Shannon Bros. & Cassidy. Two storeys and basement. 75 x 100, brick and stone.

Residences

Calgary, Alta.
Apts., $8,000, 5th st. w., Calgary [illegible] Crown Bldg. Two storeys, 40 x 78, frame construction. Plans prepared.

Residence, cost $4,000, 13th ave west, for Mrs. [illegible], 827 14th avenue west. Two storeys, 18 x 42, frame. Plans prepared.

Three residences, cost $15,000, Elbow Park, for The Alliance Investment Co., 711 First street. Two storeys, 29 x 41, Plans ready.

Dundas, Ont.
Res., $2,500, Sydenham St., for W. A. Lunn, T. H. & B. Ry. Two storeys, [illegible] x 30, brick. Plans ready.

Cedar Springs, Ont.
Residence, cost $7,000, for Dr. McKeough, Chatham, Ont. Brick construction. Plans under consideration.

Hamilton, Ont.
Residence, cost $4,000, Main street E., for A. W. Swayzie, 651 Barton street E. Architect, E. B. Patterson, King street E. Plans under way.

Residence, cost $4,000, St. Mathews ave., for E. Beasley, 299 Barton street east. Architect, E. B. Patterson, King street east. Plans in preparation; tenders called shortly.

Residence, cost $5,000. Eastbourne St. Owner and carpenter, C. W. Whitfield, 297 Lottrodge S. Mason work, John Bryers, 16 Fullerton ave. Brick construction. Other contracts not yet let.

London, Ont.
Apt. house, $10,000, Waterloo, for Stephen Pocock. Architects, Watt & Blackwell. Three storeys, brick. Plans in preparation.

Montreal, Que.
Flats, $7,000, for E. Duquette, 1949 Chris. Colomb St. Architect, Prefontaine & Drouin, 55 St. Francois Xavier street. Three storeys, 27 x 82, brick veneer. Plans ready.

Fourteen apartments, cost $50,000, S.W. Cor. Dorchester and St. Matthew streets, for P. R. L. DuTremblay, 52 St. James street. Architect, Rene Charbonneau, 15 St. James street. General contractor, O. Lamoureux, 830 St. Joseph Blvd. Three storeys and basement, 115 x 35, brick and stone. Sub-tenders called.

Oshawa, Ont.
Residence for Chas. Robson, Simcoe street. Architects, Ellis & Connery, Manning Chambers, Toronto, Ont. 2½ storeys, brick. Plans in preparation.

Ottawa, Ont.
Apartments for Meyer Drahin, 216 Besseser street. Brick and stone. Plans with owner.

Outremont, Que.
Residence, cost $5,000, for Jos. Lecavalier, 1267 Huntly street. Three storeys, 30 x 75, brick veneer. Work started.

Red Deer, Alta.
Teachers' residence, cost $4,000. Architect, C. A. J. Sharman. Secretary, W. A. Munro. 1½ storeys, 11 rooms, frame construction. Plans in preparation.

St. Catharines, Ont.
Residence, cost $9,000, for Mr. Usher. Architect, A. E. Nicholson, Queen street. Two storeys, brick and stone. Tenders open.

Saskatoon, Sask.
Residence, cost $8,000, Idy Wild, Architect, D. Webster. Two storeys and attic, 30 x 42, brick. Work started.

Todmorden, Ont.
Bungalow, cost $3,500, for R. N. Jenkins, Architect, P. H. Finney, 79 Adelaide street east, Toronto, is calling tenders for all trades.

Toronto, Ont.
One pair semi-det. residences, cost $5,000, Briar Hill ave., for J. H. McLaren, 9 Hazelton ave. Architect, P. H. Finney, 79 Adelaide street east. 2½ storeys, 32 x 44, brick. Plans being prepared.

Apartments, cost $10,000, for S. Frame, 128 Roncesvalles ave. Architect, W. F. Shepherd, 774 Shaw street. Two storeys and basement, brick. Permission of Council applied for.

Residence, cost $5,600, Ellesworth ave. near Christie street. for Rev. W. J. Brain, c/o Eden Smith & Son, 199 Yonge street. Architect, Eden Smith & Son, 199 Yonge street. Two storeys and attic, brick. Plans ready.

Rooming house, cost $10,000, King street west near Roncesvalles avenue, for D. McArthur, 15 Grafton ave. Architect, P. H. Finney, 79 Adelaide street east. Three storeys, 70 x 40, brick. Plans ready.

Apartments, cost $9,000, N.S. Foxbar road, for F. T. Smith, 37 Rosehill ave., builder. Architects, Designing & Draughting Co., 36 Toronto street. Two storeys, brick. Tenders open.

Residence, cost $3,000, for M. C. Hall, 671 Indian road, architect and builder. Two storeys, brick. Tenders received by owner.

One pair semi-det. residences, cost $5,000, for G. K. Heaman, 32 Cheltenham street. Architect, P. H. Finney, 79 Adelaide street east, 2½ storeys, 32 x 44, brick. Plans in preparation.

Two detached residences, cost $4,000, S.S. Hurndale ave., for Cardwell & Hird, 282 Queen street east. Architect, J. G. Hedges, 34 Yonge street. 2½ stys. brick construction. Tenders open.

Residence, cost $3,500, for Mr. Webb, c/o Webb & Dunlap, near 41 Shanly St. Architect, A. J. Rattray, Stair Bldg. 2½ storeys, 16 x 46, brick. Tenders open.

One pair semi-det. residences, cost $3,600, Heward ave., for E. J. Croker, 154 Booth ave. Two storeys, brick and roughcast. Tenders open.

One pair semi-det. residences, cost $8,000, Edith ave., for Jacobs & Rosin, 156 Maria street, architect and builder. Two storeys, brick. Plans drawn.

Residence, cost $3,500, Central ave. and Indian road, for Tweedy & Co., 469 Bathurst street, architect and builder. 2½ storeys, brick. Plans ready.

Three attached residences, cost $9,000, for I. Gladstone, 211 Major street, architect and builder. Tenders open.

Two residences, cost $6,000, N.S. Thorburn ave., for S. J. Gee, 452 Grace street, builder and architect. 2½ stys., brick. Tenders open.

Residence, cost $6,000, Biggar and Oakwood ave., for R. H. Graham, 862 College street. Architect and general contractor, W. P. Graham, 289 Roncesvalles avenue. Excavation, H. Jones, Florence street. 2½ storeys, 25 x 34. Tenders on other contracts received until June 25th.

One pair semi-det. residences, cost $5,000, Robnock avenue, near Irene ave., for C. W. Johnston, 598 Crawford street. Architect, L. E. Price, 870 Dovercourt road. Two storeys, brick. Tenders open for all trades but carpentry and masonry.

Two detached residences, cost $6,000, for Jno. Aldridge, 273 Crawford street, architect and builder. Two storeys, 30 x 35, brick and stone. Plans ready.

Two pair semi-det. residences, cost $6,800, w.s. Nassau street, for Samuel Schwartz, 34 Cecil street. Architect. E. A. Butler, 43 Adelaide street. Two storeys and attic, brick. Tenders open.

Two pair detached dwellings, cost $8,000, for Wm. Hare, 155 DeGrassi street. Architect, C. E. Mountain, 19 Irwin ave. Two storeys, frame. Tenders open.

Residence, cost $7,000, e.s. Glen road for A. A. Kennedy, 36 Edgar ave. Architect, J. H. Galloway, 23 Toronto St., 2½ storeys, brick. Tenders open.

Residence, cost $4,000. Owner and builder, Chas. Jolliffe, 437 Gladstone ave. Two storeys, brick. Tenders open for all trades but carpentry and masonry.

Residence, cost $4,800, Earl Gray Rd., for Rev. J. Gray, 479 Brunswick ave. General contractor, Jas. Davenport, 572 Spadina ave. 1½ storeys, 42 x 36, Tenders received for all work but masonry and carpentry.

One pair semi-det. residences, cost $4,500, for Isaac Price, 236 Greenwood ave. Architect, Jno. Hall, 85 Boultbee ave. Two storeys and attic, brick. Tenders open.

Two detached residences, cost $12,000, N.S. Temple ave., for S. J. Gee, 452 Grace street, builder and architect. 2½ storeys, brick and stone. Tenders open.

Residence, cost $7,000, Playter Blvd., for J. W. Young, 21 Danforth ave. Architect, P. H. Finney, 79 Adelaide street east. 2½ storeys, 30 x 35, brick. Plans being prepared.

Three pair semi-det. residences, cost $12,000, for L. N. Smith, 886 Dufferin street, builder and architect, Two stys., brick. Owner supervising work, but will take tenders for plumbing and heating.

Three attached residences, cost $9,000, W.S. Weston road, for W. E. Cunningham. Architect, J. H. Stanford, Bloor and Ossington. Brick. Plans in preparation.

Three detached residences, cost $10,500, Burlington Crescent, for Hudson Bros., 202 Jarvis street. 2½ storeys, 22 ft. 6 x 36, brick. Plans ready.

One pair semi-det. residences, cost $9,000, 121-3 Clinton street, for Mrs. J. Armstrong, 229 Huron street. General contractor, Wm. Moss, 189 Arthur St. Architects, Edwards & Saunders, 18 Toronto street. Tenders received for heating, wiring, painting, roofing, plastering.

Residence, cost $2,700, for Rev. H. A. Bracken, 10 Wroxter ave. Builder, W. H. Howard, 19 Englewood ave. 2½ storeys, 22 x 34, brick. Tenders open for all trades but carpentry and masonry

Residence, cost $4,800, Wychwood ave. for T. R. Young, 460 Euclid ave. Architect, J. Hunt Stanford, Bloor and Ossington ave., 2½ storeys, 24 x 34, Plans in preparation.

Three attached residences, cost $6,000, for Lancaster & Sons, 184 Dundas street, builders. Architect, P. H. Finney, 79 Adelaide street east. 2½ stys., brick. Tenders open for heating, plumbing and wiring.

Three attached residences, cost $6,000, W.S. Somerset ave., for W. Whalen, 104 Hallam street. Builder, Robert Brown, 133 Symmington ave. Two storeys, 42 x 45, brick. Tenders open for all trades but carpentry.

Residence, cost $4,000, Radford street, for P. E. Carmichael, 9 Evelyn Crescent, builder. Architect, W. Milliship, West Toronto. 2½ storeys, 14 x 24, brick. Tenders open.

One pair semi-det. residences, cost $5,000, for F. W. Kirkland, 7 Suffolk Pl. Architect, J. Hunt Stanford, Cor. Bloor and Ossington. 2½ storeys, 32 x 44, brick. Plans being prepared.

Residence, cost $4,000, Edgewood ave., for Geo. Irwin, 83 Kendal ave., architect and builder. Two storeys, brick and stone. Plans ready.

Residence, cost $4,500, Indian road, for Fred A. McCabe, 238a Jarvis street, builder. Architect, H. Hudson, 202 Jarvis street. 2½ storeys, 36 x 22, brick and stone. Tenders open.

Welland, Ont.

Residence, cost $10,000, for R. Cooper. Architect, J. W. Siddall, Janes Building, Toronto. 2½ storeys, brick and stone. Tenders called for heating, plumbing, wiring, plaster, paint, glass and carpentry.

Winnipeg, Man.

Residence, cost $4,000, Arlington St., for A. V. Thomas, 709 Portage avenue. Two storeys, 24 x 30, frame and stone. Plans ready.

Four residences, cost $16,000, Lipton street, for F. Claman. 2½ storeys, 24 x 28. Plans ready.

CONTRACTS AWARDED

Brantford, Ont.

Residence, cost $5,200, Dufferin ave. Owner and general contractor, Jno. F. Schultz. 39 x 32, brick and stone.

Calgary, Alta.

Residence, cost $4,000, for A. [illegible], 527 22nd ave. west. General contractor, R. Millican, 521 18th ave. west. Two storeys, 20 x 40.

Residence, cost $4,500, for A. A. Mostertz, 517 2nd ave. west. Owner and general contractor.

Residence, cost $4,000, Glencoe street, for C. G. Kibley, Innisfail, Alta, contractor. Two storeys, [illegible].

Residence, cost $5,500, Riverside St., for C. Poffenorth, 610 2nd ave. n.e. General contractor, L. C. [illegible], 1106 4th street n.e. Two storeys, 24 x 42, brick veneer.

Residence, cost $4,000, 15th ave. W. Owner and general contractor, C. A. Lynch, 335 6th ave. west. Two storeys, 19 x 35, frame and concrete .

Two residences, cost $4,500, Bankview, for W. C. Cooper, 38 Linehand Block. General contractor, R. W. Peach, 1512 26th ave. west. One storey, 20 x 36.

Residence, cost $4,000, Mission street, for J. B. Little, 14th ave. east. General contractor, A. B. Humnelman, 2416 5th street west. Two storeys, 23 x 39.

Two residences, Sunnyside, for Mrs. M. Carr. General contractor, R. W. Peach, 1512 26th ave. west. One storey, 20 x 36.

Two residences, cost $4,500, Mills Estate, for G. & A. Parsons. General contractor, J. W. Henderson, Board of Trade Bldg. 1½ storeys, 18 x 36.

Two residences, cost $5,000, Royal Terrace. Owner and general contractor, H. D. McDonald, 1015 5th ave. W., owner and general contractor. Brick veneer construction.

Elkhorn, Man.

Residence, cost $5,000, for R. H. Brotherhood. Architect, W. A. Elliott, Brandon. General contractor, Wm. Laston, Brandon. Two storeys, 26 x 32, concrete and brick construction.

Medicine Hat, Alta.

Residence, cost $3,000, for L. Hewitt. A. McCarter, architect and general contractor. 1½ storeys, 26 x 34.

Residence, cost $3,000, W. Linton, architect and builder. 22 x 33, brick and tile construction. Plans ready.

Two storey flats, cost $6,000, Windsor ave., for Felix Dansereau, 1211 Ontario street east, general contractor. Architect, Chas. Bernier, 15 St. James. Two storeys, 22 x 44, brick.

Residence, cost $12,000, St. Hubert street, for N. W. Lacasse, 914 Mount Royal east. Architect, Alph Content, 17 Place d'Armes. General contractor, J. Damien Lalonde, 1234 St. Lawrence Blvd. Three storeys, stone and concrete.

Six flats, cost $10,600, Gautheir and Papineau ave., for Denis Demers, 1334 St. Catherine street. Architect, L. A. Content, 11 Place d'Armes Hill. General contractor, A. Roberge, 786 Garnier street. Plumbing and heating, J. Lefrancois, 528d Gilford street. Roofing, F. Fortier, c/o Contractor. Three storeys, 36 x 65.

Residence, cost $7,000, Monkland ave. for Luc Prud'homme, Monkland and Ogilvy streets. Architect, R. Mont Briand, 230 St. Andre street. General contractor, Wm. Deslauriers, 238 Notre Dame de Grace ave. Two storeys, 36 x 45, stone veneer.

Residence, cost $15,000, Fort street. Owner and general contractor, Zepherin St. Pierre, 592a St. Denis street. [illegible]

Residence, cost $9,000, Oxford ave., for P. Blais, 296 Prud'homme ave. General contractor, Domina Cusson, 194 Prud'homme ave. [illegible] x 48.

Residence, cost $8,000, Oxford ave. Owner and general contractor, T. H. [illegible] Panet street. Two storeys, 50 x 60.

Flats, cost $16,000, Park ave., for J. Drouin, 1116 St. Denis street. General contractor, J. Martel, 1220 Messier st. Three storeys, 75 x 50, brick veneer.

Residence, cost $10,000, Redpath ave., for C. E. Guderville, 256 Bishop street. Architects, Brown & Vallance, Canada Life Bldg. General contractor, J. H. Hutchison, 69 Ambroise street. Two storeys, 40 x 42, brick.

Flats, cost $12,000, St. Urbain street, for Anastase Lapierre, Cote St. Michel, General contractor, P. Lebeau & Fils, 775 Sanguinet street. Three storeys, 50 x 70, brick.

Two flats, cost $3,500, for W. Boismenue, 280 Delaroche street. General contractor, Nar Turmaine, 284 Garnier street. Two storeys, 25 x 45, brick veneer.

Semi-detached residence, cost $3,000, Owner and general contractor, G. Zivinge, 402 Madison ave. Two storeys, 25 x 35, brick.

Ottawa, Ont.

Extension to residence, cost $14,000, Blackburn ave., for Sir Frederick Borden. Architect, C. J. Burritt, Sparks Chambers. Mason, Holbrook & Son. Carpenter, Smith Bros. 28 x 60, brick.

Residence, cost $5,500, Euclid street, for Geo. Pupham and H. Cluff. General contractor, R. A. Kemp, 149 First ave. 50 x 43, brick veneer.

Residence, cost $4,000, Oakland ave., for Frank M. Hannum, 132 Secord ave. General contractor, R. A. Kemp, 148 1st ave. 25 x 36, brick veneer.

Residence, cost $3,500, Rochester, for Mrs. Agnes Nichols. General contractor, Jas. Cummings, 397 Gladstone ave 24 x 38, brick veneer.

Residence, cost $5,000, Cambridge St., for Maegaret Stewart. General contractor, Andrew Larvegue, Brittannia. 24 x 38.

Residence, cost $3,000, Fairmount ave. Owner and general contractor, George Spratt, 19 Spadina ave. 26 x 36, brick veneer

Outremont, Que.

Residence, cost $5,000, Edward Charles street. Owner and general contractor, Jas. Bolock, 1769 Park ave., Montreal. Three storeys, 41 x 26, brick.

Residence, cost $3,000, St. Joseph Blvd., for D. Parker, 21 St. Catherine street east. General contractor, J. Hague, Azilda street. Architect, Mrs. Adamson, Molsons Bank Bldg., Montreal. Two storeys, 28 x 40, brick.

Residence, cost $10,000, Wilson & Villeneuve streets, for John McGillvray, 493 Mitcheson ave. Designer, E. W. [illegible] Mance street. General contractor, A. E. Fraser, 1935 Mance street, Montreal. Two storeys, 44 x 60, brick and stone.

Renfrew, Ont.

Residence, cost $3,000, cor. Argyle & Munroe streets, for David Humphries. Excavation and masonry, [illegible] & Sons. Carpenter, W. P. Allum. 2½ storeys, [illegible].

St. Catharines, Ont.

Residence, cost $3,500, for H. Covers. Architect, F. Wiley. Excavation and masonry, H. Nicholson. Carpenters, Williams & Missler. 24 x 32, brick construction.

St. Thomas, Ont.

Residence, cost $4,000, Ross street, for H. T. Jones. General contractor and architect, H. Shafn. Two storeys, 48 x 31, brick veneer.

Saskatoon, Sask.

Dwelling, cost $7,000, City Park, for R. M. Potter. General contractor, F. Shannon. Two storeys and attic, 36 x 40.

Toronto, Ont.

Two det. residences, cost $4,000, Pleasant Blvd., for W. H. Raine, Wards Island. Builder, F. A. Warden, 60 Galley ave. 2½ storeys, brick.

Residence, cost $3,500, N.S. Playter Cres., for Miss M. A. Lea, Leaside ave. Architect, R. A. Abraham, 23 Jordan street. Builder, Mr. Rooke. Two storeys and attic, brick.

Residence, cost $4,800, for S. Wood, 126 Cumberland street. Builder and architect, G. Adamson, 314 Manning Chambers. 2½ storeys, 30 x 30, brick and stone.

Residence, cost $4,500, for A. E. Cavell, Elliott House. Builders, Mawghan & Tushingham, 48 Quebec. Two storeys, 31 x 28, brick and stone.

Residence, cost $4,800, for Mrs. S. J. Boddy, 21 Winchester street. Architects, Chadwick & Beckett, 18 Toronto street. Builder, Edwin White, 15 Bleecker street. Two storeys, 42 x 27, brick.

Four residences, cost $12,000, St. Anne's Road, for R. C. Bustard, 18 Toronto street, general contractor. Excavation and masonry, S. Walker, 406 Dundas street. Carpenter, E. Eyre, 89 Balmoral avenue. 2½ storeys, 23 ft. 4 in. x 38 ft., brick and stone.

Six pair semi-det. residences, cost $25,000, Garnock ave., for W. W. Hiltz, 682 Broadview ave. Two storeys and attic, brick. Owner buys all material and supervises work.

Verdun, Que.

Residence, Galt street. Owner and general contractor, I. Proulx, 570 Church ave. Three storeys, 43 x 70, brick.

Winnipeg, Man.

Residence, cost $5,000, Preston street. Owner and general contractor, W. G. Holmes, Assiniboine river bridge. 2½ storeys.

Residence, cost $3,000. Owner and general contractor, G. Baskin, 517 Castle ave. Two storeys, 26 x 28.

Residence, cost $5,000, Simcoe street. Owner and general contractor, H. Halderson, Merchants Bank Bldg. Two storeys, 26 x 34.

Residence, cost $3,500, Leslie street, for J. Liebel. General contractor, J. M. Messler. Two storeys, 32 x 36.

Westmount, Que.

Four semi-det. residences, cost $18,000, Grosvenor ave., for S. G. Newton, 108 Crescent street, Montreal, contractor. Designer, E. S. Blanchard, c/o S. G. Newton. Two storeys and basement, 150 x 55, brick.

Business Buildings and Industrial Plants

Calgary, Alta.

Warehouse, 10th ave. and 4th street, for Moorhouse & Co. Architect, J. G. Lavis, Cedar ave. Three storeys, 50 x 120. Plans in preparation.

Racing stables, cost $10,000, Victoria Park. Two storeys, 42 x 100. Tenders received by J. T. Burns, c/o Exhibition Board. Work to be done by day labor.

Crabtree Mills, Que.

Extensions, dam, etc., for E. Crabtree & Son, Ltd., paper manufacturers. Plans being prepared by T. Pringle & Son, Ltd., Coristine Bldg., Montreal.

Danville, P. Q.

Bank building, for Canadian Bank of Commerce. Stone and brick. Plans under consideration.

Digby, N.S.

Canning factory, cost $3,000, for D. & O. Sproule. Plans in preparation.

Fort William, Ont.

Alterations to business block, cost $15,000, on Victoria street. Agent, A. Seave, Cuthbertson Block. Passenger elevator required and interior equipment.

Ingersoll, Ont.

Bank building, for Imperial Bank of Canada. Plans under consideration.

Medicine Hat, Alta.

Refrigerating and packing plants, cost $15,000, for The Western Canada Cold Storage & Packing Company. The engineer of Kent Co., Ltd., Montreal, is inspecting plant and plans are being prepared for remodelling.

Garage, for E. L. Becker. 1½ storeys, 50 x 62, cement and brick. Complete equipment required. Tenders open.

Moncton, N.B.

Factory, cost $7,500, Botsford street, for Havelock Mineral Springs Co., Ltd., c/o J. A. Marven & Co., Main street. Architect, W. C. Barnes, Wyse Bldg., Main street. Two storeys, 60 x 90. Plans ready.

Montreal, Que.

Offices and factory, cost $100.000, for A. Sommer & Co., Ltd., 292 St. Catherine west. Architect, Hutchison, Wood & Miller, 50 Royal Insurance Bldg. Ten storeys, 72 ft. on Mayor street, 176 ft. on Berthelet St., 170 ft. deep. Plans completed.

Warehouse, Youville Sq., for McComber & Cummings, 373 St. Paul street. Ten storeys, 32 x 120. Plans in preparation.

Extension to store and residence, cost $7,000, 848 St. Catherine street, for Vipond & Vipond, 133 Youville Sq. Architect, Mr. Rodden, 132 Board of Trade Bldg. Three storeys, stone and brick. Extending first storey to street line and changing into store. Foundation started.

Manufacturing plant, for N. K. Fairbank & Co., Cote St. Paul. Plans prepared by T. Pringle & Son, Ltd, Engineers and architects, Coristine Building, Montreal.

Extensions to reclaim plant, for Canadian Rubber Co., of Montreal, Limited. Plans being prepared by T. Pringle & Son, Limited, Coristine Bldg., Montreal.

Niagara Falls, Ont.

Extension to factory, River Road, for Spirella Corset Co. Manager. E. R. Blew. Plans in preparation.

Factory addition, Centre street, for Can. Shredded Wheat Co., Centre St. Plans considered.

Red Deer, Alta.

Extension to offices, cost $3,000, Ross street. Secretary-treasurer, A. J. Stephenson, Red Deer. Architect, C. A. J. Sharman, Red Deer. Two storeys, 40 x 60, brick. Plans in preparation.

Office bldg., cost $6.000, for E. Michener, M.P.P. Architect, C. A. J. Sharman. Brick and cement. Plans in preparation.

St. Agathe, Man.

Warehouse for Imperial Oil Co., Ltd., Winnipeg. Frame and metallic construction. Foundations started.

St. Catharines, Ont.

Stores and residence, St. Catharines House, for N. Stevens. Architect, A. E. Nicholson, 46 Queen street. Three stys. 48 x 92, brick. Tenders open.

Saskatoon, Sask.

Warehouse, cost $25,000, Blk 9, Plan G. F., for Dominion Fence Co. Plans in preparation.

Three Rivers, Que.

Cotton mill plant for St. Maurice Valley Cotton Mills. Plans being prepared by T. Pringle & Son, Ltd., Industrial Engineers and Architects, Montreal and Toronto.

Toronto, Ont.

Store and apartments, cost $3,000, for M. W. Little, 490 Bloor street west. Architect, G. M. Millar, 59 Yonge street. Three storeys, brick. Tenders open.

Three stores and residences, cost $3,300, 289-293 Victoria street, for White & Fenton, 2 Earl street. Builder, W. I. Kincade & Co., 51 Cumberland street. Tenders open for all trades but carpentry.

Stores and offices, cost $4,000, Dundas street near Keele street, for E. M. Bull, Weston, Ont. Two storeys, brick. Tenders open.

Factory, cost $5,500, for A. Thomson, 18 Agnes street. Two storeys, brick. Plans ready.

Warehouse and offices, cost $75,000, for Otis Fensom Elevator Co., Ltd. Traders Bank Bldg. Architect, G. W. Gouinlock, Temple Bldg. Six storeys and basement, brick and reinforced concrete. Tenders open.

Stable, cost $3,500, between Oak and Taylor streets, for S. W. Marchment, 133 Victoria street. Architects, Edwards & Saunders, 18 Toronto street. Two storeys, 30 x 75, brick and concrete construction. Tenders open.

Stable, cost $6,000, for J. Kinnear, 20 Spadina road. Architect, J. A. Harvey, Manning Chambers. Two storeys. Plans in preparation.

Ten stores and apartments, cost $65,000, Cor. Queen and Hambly streets, for F. G. McBrien, 1000 Bloor street west. Three storeys, 140 x 150, brick construction, stone foundation, electric light, tar and gravel roofing. Work to be done by day labor. Plans ready; foundation started.

Vancouver, B.C.

Store and apartments, 4th avenue W., for Miss Lowndes. Architect, W. F. Gardiner, 347 Pender street west. Two storeys and basement, 50 x 60. Tenders open.

Verdun, Que.

Store and residence, cost $5,000, for Casimir Allard, 1161 Wellington street. Three storeys, brick. Plans prepared.

Winnipeg, Man.

Machine shop, cost $18,000, Ross and Tecumseh streets. Plans at office of Engineer, Mr. H. N. Ruttan, 223 James ave. Tenders close June 13th.

CONTRACTS AWARDED

Amherst, N.S.

Warehouse, cost $6,000, Fifth ave., for Douglas & Co. Architect and general contractor, J. N. Jage. Carpentry, painting and glazing, L. Allen. Two storeys, 70 x 20, brick.

Calgary, Alta.

Stables and stores, cost $20,000, Third ave. west, for Dominion Express Company, Winnipeg. Architects, Woodman & Carey, Winnipeg. General contractors, Carter, Halls & Aldinger, Limited, Calgary. Two storeys, 65 x 74.

Stores and residences, cost $5,000, Spring Well Park, for Wheeler & Zwinner, Beveridge Block. General contractor, A. Hopkins, Travis Block. Two storeys, 28 x 50.

Store, cost $5,000, Crescent Heights, for Mrs. Palmer, Blue store, 8th ave. east. General contractors, Bennett & Debnan, 442 14th ave. N.E. One sty., 62 x 40.

Warehouse, cost $50,000, 11th ave. W., for L. T. Newburn & Co., 8th ave. W. General contractors, Fyshe Martin & Co., Dominion Bank Bldg. Four stys., 50 x 114, brick.

Stores, Mount View, for A. Van Aalst, Box 656, general contractor. Architect, J. B. Bennett. One sty., 50 x 55.

Fort William, Ont.

Addition to hotel, cost $10,000, Victoria ave., for Jas. Doyle, St. Louis Hotel, Architect and general contractor, C. Ward. Three storeys, 26 x 56-6, brick

Moncton, N.B.

Factory, for Havelock Mineral Water Bottling Establishment. General contractor, W. Budd. Two storeys, 90 x 40.

Montreal, Que.

Store and two dwellings, cost $6,000, Owner and contractor, J. A. Laing, 527 Centre street. Three storeys, 28 x 28 brick and stone.

Warehouse, cost $40,000, St. Vincent and St. Therese, for A. Hudson, 259 St. Paul street. Architect, J. O. Turgeon, 55 St. Francois Xavier street. General contractors, Fulton & Archambault, [illegible] Visitation street. Iron doors, etc., etc., Stinson-Reed, Builders' Supply Co., Eastern Tps. Bank Bldg. Reinforced concrete, F. J. Jago & Co., 626 Coristine Bldg. Five storeys, 100 x 53, plastic brick construction.

Store and residence, cost $10,000. Owner and general contractor, T. S. Vipond & Company, [illegible] Youville Sq. Architect, Mr. Rodden, 132 Board of Trade Bldg. Four storeys, 35 x 25, stone and brick.

Slasher House, for Dominion Textile Co., Hochelaga street. Engineers, T. Pringle & Son, 419 Coristine Bldg. Roofing, Geo. W. Reed & Co., Ltd, 37 Antoine street.

Ottawa, Ont.

Garage, cost $3,000, Metcalfe street, for Denis Murphy, 254 Metcalfe street. Architect, J. A. Ewart, Sparks Chambers. Excavation, C. Holbrook & Son. Mason, Mr. Adamson. 25 x 36, brick.

Shops, cost $5,000, Nepean, for F. Jennan & S. A. Luke & Co. General contractor, J. & C. Low, 262 Catherine street. 40 x 40, brick.

Addition to office and factory, for the Ottawa Truss & Surgical Mfg. Co., Ltd. Architect, J. A. Ewart, Sparks Chambers. Excavation, C. Holbrook & Son. Mason, Mr. Adamson. Brick construction.

Quebec, Que.

Alterations to shop and dwelling, cost $7,000, for B. Leonard. Architects, Staveley & Staveley, St. Peter street. Painting and glazing, owner. Plumbing and heating, John Walker, 122 St. John street. Roofing, L. H. Peters, St. Angele. Three storeys, 40 x 60, brick.

Saskatoon, Sask.

Office building, 3rd street, for S. R. Ross. Architects, Edward & W. S. Maxwell. General contractors, Smith Bros. & Wilson. Seven storeys and basement, brick and stone.

Sherbrooke, Que.

Extension to store and warehouse, cost $10,000, for Codere Fils et Cie, Wellington street. General contractor, Simoneau & Deou, Metropole Bldg. 40 x 70, brick.

Tillsonburg, Ont.

Warehouse and dwelling, Oxford St., for Frank McDonald. Architect and contractor, Tillson Company. Masonry, W. Drake. Two storeys and basement, 75 x 50, brick and cement block.

Toronto, Ont.

Pair stores, cost $5,000, St. Clair ave., for Mrs. Grafton, 281 Russell Hill road. Architect, J. H. Stanford, Bloor and Ossington ave. Builder, Jas. Davenport, 572 Spadina ave. Two storeys, 40 x 48, brick.

Store, cost $4,000, 804 College street. General contractor and architect, W. P. Graham, 289 Roncesvalles avenue. Two storeys, 15 x 40, brick.

Verdun, Que.

Store and residence, cost $10,000. Owner and general contractor, R. Senecal, 25 Regina street. Three storeys, 50 x 54, brick.

Store and dwellings, cost $12,000, [illegible] Owner and contractor, J. H. Poivier, 294 Lesage street. Three storeys, 75 x 42, brick.

Winnipeg, Man.

Stables and carriage shed, cost $[illegible]500, City Yards. Architect, Mr. H. N. Ruttan, 223 James ave. General contractor, R. J. Barker, Strathcona School, Burrows ave. Solid brick construction.

Extension to garage, 407 William ave., for A. C. McRae, 407 William ave. Architect, J. N. Semmens, 903 McArthur Bldg. General contractor, J. Barber, 59 Pearl street. Two storeys, 70 x 75, brick and reinforced concrete.

Power Plants, Electricity and Telephones

Vernon, B.C.

Electrical equipment. Consulting engineers, Mather, Yuill & Co., Limited, Vancouver, B. C. Tenders in duplicate received by Clerk, D. G. Tate, until June 10th, for following, delivered f.o.b. Vernon: one 125 kw. three-phase, sixty cycle generator; one exciter, direct connected to above; one five-panel switchboard; one series tungsten or one arc lighting system. Specilcations at office of MacLean Daily Reports, 220 King St. W., Toronto.

Winnipeg, Man.

Electric locomotive, cost $7,938, Bird Hill Gravel Pit. Engineer, J. G. Glassco, 54 King street. General contractor, Ottawa Car Company, Ottawa, Ont.

New Companies

Electric Company of Canada, Limited, has been incorporated with a capital of $1,000,000 to carry on a general manufacturing and contracting business with head office at Toronto. The provisional directors are G. H. Sedgewick, A. G. Ross and A. E. Langman, all of Toronto.

Dominion Construction Co., Ltd., has been incorporated with a capital of $150,000 to carry on business as contractors, canal and railway builders, etc., with head office at Toronto. The provisional directors are T. R. Hinds, H. E. Williams and G. S. Deeks, all of Toronto.

The Toronto Building and Land Company, Limited, has been incorporated with a capital of $50,000, with head office at Toronto, The provisional directors are W. J. McCallum and C. J. McLaughlin, both of Toronto.

Prudential Investments Limited has been incorporated with a capital of $40,000, to carry on a general land and building company with head office at Toronto. The provisional directors are R. B. Haley, S. G. Hoffman, and G. B. Mansfield, all of Toronto.

Hub Realty Company, Limited, has been incorporated with a capital of $40,000 to carry on a general land and building company with head office at Toronto. The provisional directors are J. H. Laverty, J. E. Skirrow and T. F. Silvester, all of Toronto.

[illegible] Realty Company, Limited has been incorporated with a capital of $42,000, to carry on a general land and building business with head office at Toronto. The provisional directors are A. K. Goodman, D. G. M. Galbraith, and E. G. Joy, all of Toronto.

Oshawa Land and Investments Limited has been incorporated with a capital of $100,000 to carry on business as a general land and building company, with head office at Toronto. The provisional directors are T. J. W. O'Connor, J. W. Broudy and W. A. Goetz, of Toronto.

The Big Four Brick Company, Limited, has been incorporated with a capital of $[illegible] to manufacture and deal in

(Continued on page 76)

Tenders and For Sale Department

To Architects and Engineers

[illegible] s in a tender must see your [illegible] st. If you are in [illegible] is in Vancouver the inspection [illegible] is a [illegible]. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at [illegible] all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

Newmarket Public School

Sealed tenders (separate or in bulk) will be received by the architect up to **the evening of June 15th**, for the erection of a six-roomed public school in the Town of Newmarket.

The building will be of stone and brick with artificial stone trimmings; flat roof, plumbing, warm air heating.

Plans and specifications may be seen at the Architect's office and also at the office of Contract Record, Toronto, on and after May 25th.

The lowest or any tender not necessarily accepted.

Dr. C. H. R. CLARK,
Chairman of Board.
O. E. TENCH, Architect,
Newmarket, Ont.
21-21

TENDERS

For Drainage Work

Stanley Township

Tenders for Drainage Work of by-law **11-1911**, estimated at 30,500 cubic yards, will be received by the undersigned up to **June 8th, 1912**.

All tenderers must deposit a marked cheque for ten per cent. of their proposed contract price with their tender. Copies of by-law sent on application.

The lowest or any tender not necessarily ac-

ROBT. J. RICHARDSON,
Clerk of Stanley Township,
21-23 Varna, Ont.

Special Notice to Contractors

Could supply you with any quantity of RE-LAYING RAILS or for REINFORCING CONCRETE at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. **11-t.f.**

CITY OF VERNON, B.C.

Tenders, in duplicate, for Electrical Equipment, will be received by D. G. Tate, City Clerk, up to Three O'Clock P.M., **June 10th, 1912**, for the delivery F.O.B. Vernon, B.C., of the following:—

1—125 K.W., Three Phase, Sixty Cycle Generator.
1—Exciter, direct connected to above.
1—Five panel Switchboard.
1—Series Tungsten or
1—Arc Lighting System.

Specifications will be on file at the following offices: Canadian Electrical News, Toronto; Contract Record, Toronto; Canadian Engineer, Montreal and Winnipeg, and Mather, Yuill & Company, Limited, Consulting Engineers, Vancouver, B.C. 20-23

The Corporation of the City of Vernon

Waterworks Contract No. 1.

Sealed tenders, endorsed "Waterworks Contract No. 1," will be received by the undersigned up to 5 o'clock p.m., **June 10, 1912**, for the supply and delivery of 17,000 feet of 4-inch cast iron pipe and 10,500 feet of 6-inch cast iron pipe. Specifications can be obtained from the City Engineer's office, City Hall, Vernon, B. C. A deposit equal to 5 per cent. of the amount bid must accompany each tender. The lowest or any tender not necessarily accepted.

21-23 D. G. TATE, City Clerk.

Steam Shovels For Sale

The following used steam shovels are for sale and can be delivered promptly.

1—95-ton Bucyrus shop No. 1165 3½ yd. dipper.
1—90-ton Marion New Boiler, 3½ yd. dipper.
3—70-ton Bucyrus shop Nos. 802, 803, 804, 2½ yard dippers.
2—65-ton Bucyrus shop Nos. 745, 747, 2½ yd. dippers.
1—60-ton Marion shop No. 1405, 2½ yd. dipper.
2—45-ton Bucyrus 1¼ yd. dippers.
2—Model 20 Marions, shop Nos. 1084, 1477, 1½ yard dippers, both just rebuilt.
2—Little Giant traction shovels, 1¼ yd. dippers.
2—No. 3 Thews, standard gauge, 1½ yd. dippers.
2—No. 1 Thews, one traction the other one M.C.B. trucks, 1 yard dippers.
3—No. 0 Thews, good shape, ⅝ yard dippers.

Full particulars on request.

Any of the above furnished without boilers if preferred. Our spring bulletin shows a large list of used contractors' equipment for sale. A postal brings it.

MARSH COMPANY,
Old Colony Building,
Chicago, Ill.

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

The Corporation of the City of Vernon

Waterworks Contract No. 2.

Sealed tenders, endorsed "Waterworks Contract No. 2," will be received by the undersigned up to 5 o'clock p.m., **June 10, 1912, for the supply** and delivery of 125 gate valves and 36 hydrants, ranging in size from 4-inch to 8-inch. Specifications can be obtained from the City Engineer's office, City Hall, Vernon, B. C. A deposit equal to 5 per cent. of the amount bid must accompany each tender. The lowest or any tender not necessarily accepted.

21-23 D. G. TATE, City Clerk.

TENDERS

Masonic Temple

Tenders will be received at the office of Messrs. Crane & Pennington, architects, Boug Building, Windsor, Ontario, up to noon, **June 15th, 1912**, for a six-storey Masonic Temple Building. Tenders may be either general or separate. A certified cheque for five per cent. to accompany tender, otherwise the bid will not be considered.

In the reception of tenders for the work the owners incur no obligation to accept the lowest or any tender.

CRANE & PENNINGTON,
Windsor, Ont.
22-23

CITY OF MOOSE JAW,
SASKATCHEWAN

Tenders for Ornamental Light Standards

Sealed tenders marked "Tenders for Lamp Standards," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon, on **Friday, June 14th, 1912**, for the supply and delivery of 50 Ornamental Light Standards suitable for Tungsten lighting.

Plans, specifications and all information may be obtained from J. D. Peters, Electrical Superintendent, Moose Jaw.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL,
City Commissioners.
Moose Jaw, Sask., May 14, 1912. 21-23

Tenders for Cement Arch Bridge

Sealed tenders, addressed to the undersigned and accompanied by a certified cheque for $100 will be received up to 6 p.m. on **Monday, June 10th, 1912**, for the construction of a 60-foot Cement Arch Bridge over Catfish Creek, in the Town of Aylmer, Ontario.

Plans and Specifications can be seen at the office of J. A. Bell, Engineer, St. Thomas, Ont., or at the office of the Town Clerk, Aylmer.

D. C. DAVIS,
22-23 Town Clerk.

Tenders Wanted

Bulk and separate tenders, which shall be marked "Tenders for Alexandra Church," will be received up until noon, **Wednesday, June 12**, for all or any of the different branches required in making changes to an existing Sunday School, and building a new church building, for the Alexandra Presbyterian Church.

All tenders shall be addressed to Dr. W. D. Wiley, Chairman of the Building Committee, Brantford, Ont.

Plans and specifications may be seen at the office of the Architects, Messrs. Taylor & Taylor, Brantford, Ont.

The lowest or any tender not necessarily accepted. 22-23

TENDERS
NORTH BAY

Tenders will be received up to **June 15th, 1912**, for the construction of about 23,000 lineal feet of Cement Sidewalk 5 ft. wide, including filling.

Specifications will be supplied on application to the undersigned.

The lowest or any tender not necessarily accepted.

T. N. COLGAN,
Commissioner of Works,
23-24 North Bay, Ont.

TO
CONTRACTORS

Sealed tenders, endorsed "Tenders for Fire-proofing, etc.," addressed to the undersigned, will be received at this department up to noon on **Monday, the 10th of June, 1912**, for the terra cotta work, fire-proofing and roofing of the new Government House, Chorley Park, Rosedale, Toronto. Plans and specifications can be seen at this department.

An accepted bank cheque, payable to the order of the Hon. J. O. Reaume, Minister of Public Works, for five per cent of the amount of the tender, and the bona fide signatures and addresses of two sureties, or the bond of a guarantee company, approved by this department, must accompany each tender. The department will not be bound to accept the lowest or any tender. By order,

H. F. McNAUGHTEN, Secretary.
Department Public Works, Ontario.
Toronto, 29th May, 1912.

Newspapers inserting this without authority will not be paid for it. 23

Position Vacant

First-class opportunity in Toronto, Ontario, for an Engineer experienced in the design and superintendence of reinforced concrete. Only capable man need apply. Box 508, Contract Record & Engineering Review, Toronto, Ont. 23

TENDERS
NORTH BAY

Tenders will be received by the undersigned up to **June 15th, 1912**, for about 4,000 feet of Standard 4-in. Cast Iron Water Pipe, five 4-in. Valves with Valve Boxes, and three Hydrants.

The lowest or any tender not necessarily accepted.

T. N. COLGAN,
Commissioner of Works,
23-24 North Bay, Ont.

Corporation of Oshawa
Concrete Sidewalks

Tenders will be received up to noon of **Saturday, June 8th, 1912**, for the construction of 25,000 square feet more or less, of Cement Concrete Sidewalks.

Specifications and other information may be obtained at the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

FRANK CHAPPELL, C.E.,
Town Engineer.
Town Hall, Oshawa. 23

Engineer Wanted

Applications addressed to H. Brown, City Clerk, Brandon, Man., will be received by the City Council up to **June 10th** for the position of street railway engineer for the City of Brandon. Applicants must have constructing and operating experience in street railways and must be prepared, if necessary, to form a part of a public utility commission for the city. Must also state salary expected and experience and must be competent to take over the entire management of said street railway system.

HARRY BROWN, City Clerk,
23 Brandon, Man.

TOWN OF STEELTON
Province of Ontario

Tenders for Aqueduct and Concrete Pavements

Sealed tenders will be received by the Town Clerk until 8 p.m. on **Tuesday, June 18th, 1912**, for the construction of a reinforced concrete aqueduct, approximately 1,900 feet long, and about 1,000 square yards of concrete pavements.

Plans, profiles and specifications may be seen at the office of the Town Engineer, Town Hall, [illegible]

A certified cheque for $1,000 shall accompany each tender.

The lowest or any tender will not necessarily be accepted.

JAS. LYONS, Esq., Mayor,
Steelton, Ont.
[illegible], Esq., Town Clerk.
W. H. REDFERN, Esq., Town Engineer.
23-24

TENDERS

Tenders will be received up to 8 o'clock on the evening of **June 17, 1912**, for the construction of 2,000 feet of granolithic sidewalk in the Village of Athens. Specifications may be had on application to the undersigned to whom tenders should be addressed. The lowest or any tender not necessarily accepted.

23 G. F. DONNELLY, Village Clerk.

CITY OF BRANTFORD
Tenders for
Concrete Sewer Pipe

Sealed tenders, addressed to Alderman Samuel Suddaby, Chairman of the Board of Works, c/o of the City Clerk, Brantford, Ontario, will be received till 12 o'clock noon on **Saturday, June 15th, 1912**, for the furnishing of about 6,000 ft. of Reinforced Concrete Sewer Pipe, varying in size from 30 inches to 45 inches.

Specifications may be seen and instructions to bidders and forms of tender obtained at the office of the City Engineer.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer.
City Engineer's Office,
Brantford, May 29th, 1912. 23-24

Cableways For Sale

We have five complete Cableways all in good working condition. Will sell at a sacrifice.

1—500 ft. span, 50 H.P. Lidgerwood 10 x 12 Reversible Engine; main cable 2 in. Towers 50 ft.; 3½ yd. skip.

1—650 ft. span, 50 h.p. three drum engine; main cable 2 in.; 3,700 feet long. Carriage complete with ⅝ in. hauling and hoisting cable. 2—75 ft. A frame towers, 1⅝ Hayward Clam Shell Bucket.

1—900 ft. span, Flory Electric Hoisting Engine; main cable 1¾ in., complete with carriage, hauling and hoisting ropes, etc.

1—750 ft. span, 15-ton capacity, Lidgerwood, 12¼ in. x 15 in. reversible engine or main cables 2¼ in. diam.; 850 ft. long; elegant shape.

1—1100 ft. span, Lidgerwood cablewap complete; 9 x 10 engine, 1½ in. cable.

Further particulars and location on request. Big Spring Bulletin of Second-Hand Equipment, ready for mailing. A postal brings it.

MARSH COMPANY,
Old Colony Building,
Chicago, Ill.

Tenders for Concrete Arch and Bridge Abutments

Tenders for Concrete Arch and Bridge Abutments

[illegible] **Wednesday, June 12th, 1912**, for the construction of the following:

1. [illegible] Sykes street.

2. [illegible] on Owen street.

[illegible]

Plans and specifications may be seen at the [illegible]

The lowest or any tender not necessarily accepted.

[illegible]
[illegible]
[illegible]

For Sale

[illegible] Electrical Contracting and Retail [illegible] Ont. to town [illegible] has other [illegible] time. Ad[illegible] Contract Record, Toronto, Ont.
23-24

Notice to Contractors

Sealed tenders addressed to the undersigned will be received up to 7 o'clock p.m., on **Monday, 17th of June**, for the erection of a four-room addition to building known as the King Edward School, Sault Ste. Marie, Ontario. Plans and specifications may be seen at [illegible] & Murdock. The lowest or any tender not necessarily accepted.

J. C. RICHARDSON,
23-24 Sec.-Treas. School Board.

CITY OF REGINA
Province of Saskatchewan

Supply of Steel, Cement and Castings for Torhill Reservoir, Boggy Creek

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon on **Friday, June 14th, 1912**, for the supply of about 350 tons of reinforcing steel bars, **145** tons of R. I. joists, 6000 barrels of Portland cement and castings for the proposed Torhill Reservoir.

The city reserves the right to reject any or all bids and to waive any irregularities therein.

Accepted cheque covering five per cent. of the amount of the bid must be deposited with each tender.

Copies of plans, specifications, schedules and forms of tender and full particulars may be had from the undersigned on receipt of cheque for $25.00 made payable to the City Treasurer, which amount will be refunded when the plans and documents are returned to the undersigned.

R. O. WYNNE-ROBERTS, M.Inst.C.E.,
Consulting Engineer, Regina, Sask.
City Hall, Regina, May 28, 1912. 23

Township of Lancaster

TENDERS

Sealed tenders addressed to the undersigned and marked "Bridge Tenders," will be received until noon, **15th June, 1912**, for the manufacture and erection of a Warren Truss Steel Highway Bridge over the River Beaudeth at Glen Nevis, 7th Con., Township of Lancaster, Glengarry County. The site of this bridge is about 2 miles from Dalhousie Mills Station on C.P.R.

1. The bridge to consist of one span 70 feet between abutments and 73 feet over all, by 16 foot clear roadway—concrete floor.

2. The structure is to be made and erected in accordance with the plans and specifications which may be seen at the office of Mr. J. McLennan, C.E., Williamstown, or at my office, and every detail of work not provided for shall be carried out in accordance with the Ontario Government specifications for Steel Highway Bridges, 1911.

3. Payment of 50 per cent. of the contract price will be made on the work and material [illegible] at the bridge site and the balance on [illegible] tion and acceptance of the work by [illegible]

4. The substructure will be ready for the superstructure by 1st September, 1912.

5. The Municipal Council do not bind themselves to accept the lowest or any tender.

A. J. MacDONALD, Twp. Clerk,
23-24 North Lancaster, Ont.
May 29th, 1912.

TENDERS

Bulk or separate tenders will be received by the undersigned for the erection and completion of a Sunday School Building for St. George's Church, St. Catharines, Ontario, until 5 p.m., **10th day of June, 1912.**

The lowest or any tender not necessarily accepted.

A. E. NICHOLSON, O.A.A., Architect,
23 46 Queen St., St. Catharines, Ont.

Tenders for Pavement

Sealed tenders will be received by J. D. Blue, Village Clerk of Dutton, until noon on **Saturday, the 15th of June**, for the excavation and paving of Main Street. Approximate quantities are 1,450 lineal feet of concrete curb and gutter; 1,610 sq. yds. brick with concrete foundation, and 3,210 sq. yds. macadam, Tarvia finish.

Further particulars may be had from the above or the undersigned.

Lowest or any tender not necessarily accepted.

JAS. A. BELL & SON,
Civil Engineers.
St. Thomas, June 3rd, 1912. 23

Tenders For Steel Bridges

Sealed tenders, marked "Tenders for Steel Bridges," will be received by the undersigned up to noon on the **17th day of June, 1912**, for the supplying of material, construction and erection of three 50-feet spans and one 40-feet span steel truss bridges in the Township of Mono, between 7 and 10 miles from Orangeville.

Specifications and all necessary information may be obtained from the undersigned.

The lowest or any tender not necessarily accepted.

C. R. WHEELOCK,
Civil Engineer.
Orangeville, Ont.
June 1st, 1912. 23-24

Township of Lancaster

TENDERS

Sealed tenders, marked "Bridge Tenders" will be received by the undersigned clerk of the Township of Lancaster at his office, North Lancaster, Ont., until noon of the **15th day of June, 1912**, for the construction of concrete abutments for a bridge over the River Beaudeth at Glen Nevis, Con. 7, Lancaster Township, County of Glengarry.

The work comprised in this contract will include excavating for the foundation, supplying all material for constructing two abutments and wing walls, clearing the site of all surplus material, removal of old bridge, etc.

The engineer's estimate of concrete is 140 yards. Plans and specifications may be examined at the office of Mr. J. McLennan, C.E., Williamstown, Ont., and at my office. Each tender shall be accompanied by a cash deposit or accepted cheque in favor of the municipality for $150. The lowest or any tender not necessarily accepted.

ARCH'D. J. MacDONALD, Clerk.
North Lancaster, Ont., 29th May, 1912. 23-24

Situations Wanted

Scotch engineer experienced in structural and concrete work wants position as superintendent or inspector. Four years Canadian experience. Box 510, Contract Record, Toronto. 23-24

TOWN OF THOROLD
Province of Ontario

Pavements and Roadways

Sealed tenders will be received by the Town Clerk until 8 p.m. on **Wednesday, June 12, 1912**, for constructing:

(a) Permanent Pavements, 7,300 square yards, approximately.

(b) Macadamized Roadways, 3,500 square yds., approximately.

No tender necessarily accepted.

Plans, specifications, etc., may be seen at the Town Hall, Thorold. For further information address the Engineers, Mail Building, Toronto.

JOHN BRODERICK, Esq., Mayor.
D. J. C. MUNRO, Esq., Town Clerk.
23 CHIPMAN & POWER, Engineers.

CITY OF REGINA
Province of Saskatchewan

Construction of Torhill Reservoir

Sealed tenders addressed to the City Commissioners, Regina, will be received until noon on **Friday, June 21st, 1912**, for the construction of Torhill reinforced concrete circular reservoir and for works incidental thereto.

The city will supply steel, cement and castings. The city reserves the right to reject any or all bids and to waive any irregularities therein.

Accepted cheque for **$5000** must be deposited with each tender.

Copies of plans, specifications, schedules, and forms of tender and full particulars may be had from the undersigned on receipt of a cheque for $25.00 made payable to the City Treasurer, which amount will be refunded when the plans and documents are returned to the undersigned.

R.O. WYNNE-ROBERTS, M.Inst.C.E.
Consulting Engineer, Regina, Sask.
City Hall, Regina, May 28, 1912. 23

Board of Education

Sealed tenders addressed to the Secretary-Treasurer of the Board, will be received until **Friday Noon, June 14th, 1912**, for

School Furniture, including Commercial Desks

Midsummer Repairs
including
Painters and Tinsmith Work

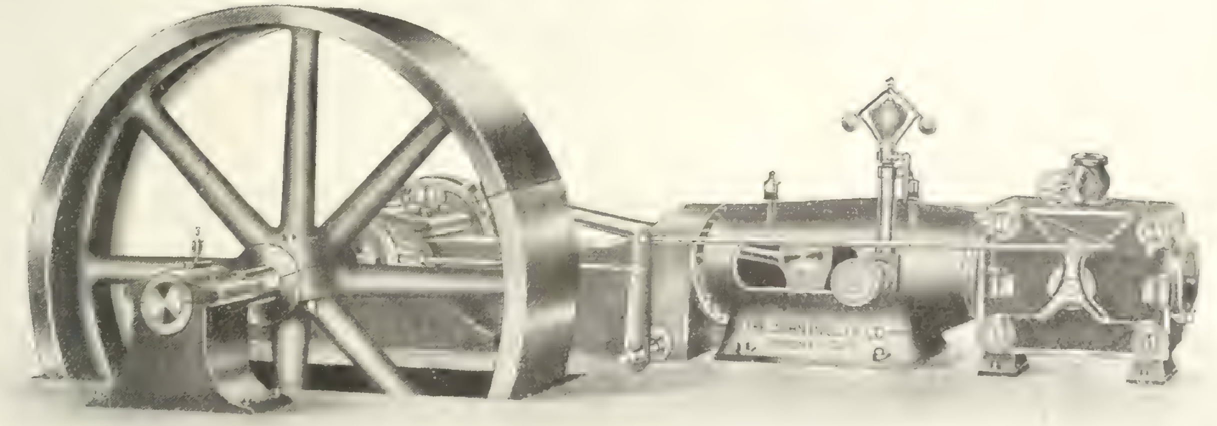
Masonery Work Retaining Walls at

Annette St. and Withrow Ave. Schools

Specifications may be seen, and all information obtained at the office of the Superintendent of Buildings, City Hall, on and after **Monday, June 10th.** Each tender must be accompanied with an accepted bank cheque for five per cent. of the amount of tender, or its equivalent in cash. Tenders must be in the hands of the Secretary-Treasurer at his office in the City Hall not later than 12 o'clock noon on the day named, after which no tender will be received. The lowest or any tender will not necessarily be accepted.

W. W. HODGSON,
Chairman of Committee.
W. C. WILKINSON,
23 Secretary-Treasurer.

INGLIS CORLISS ENGINES



JUDGED by the highest standards of economy, efficiency and small cost of upkeep, Inglis Corliss Engines have never had to acknowledge a superior.

Inglis Corliss Engines are always reliable and have been proved for 35 years. Their steady, positive action has won the confidence of engineers all over Canada.

We also manufacture marine engines, steam and motor driven pumps, penstocks, stand-pipes, presses, tanks, hydraulic machinery, blast furnaces, air compressors, vacuum pumps, etc.

Ask for our representative to call

THE JOHN INGLIS COMPANY LIMITED

Engineers and Boiler Makers **Strachan Ave., TORONTO**

New Companies

(Continued from page 71)

brick, cement and clay products, etc., with head office at Toronto. The provisional directors are J. McFarlane, M. J. Walker and C. J. Parker, of Toronto.

York Sandstone Brick Company, Ltd., has been incorporated with a capital of $80,000, to manufacture brick and tile, sand and lime products, etc., with head office at Toronto. The provisional directors are J. F. Lennox, G. E. Oxley and C. W. Plaxton, of Toronto.

Lewis Building Company, Limited, has been incorporated with a capital of $50,000 to carry on business as electrical and general contractors with head office at Montreal. The incorporators are C. G. Greenshields, E. R. Parkins and R. E. Allan, all of Montreal.

Beresford Realty Company, Limited, has been incorporated with a capital of $50,000, to carry on business as a land and building company, with head office at Montreal. The incorporators are H. J. Elliott, E. C. Baker and G. L. Alexander, all of Montreal.

La Compagnie Electrique des Laurentides Limitee has been incorporated with a capital stock of $149,000, to acquire water powers and develop and generate electricity or other power, with head office at St. Lin des Laurentides. The incorporators are Adelard Roy, Ludger Vennes, of Laurentides, J. F. Daniel of St. Esprit.

The Sherbrooke Construction Company, Limited, has been incorporated with a capital of $100,000, to carry on business as electric hydraulic and civil engineers, contractors, designers, etc., with head office at Sherbrooke, the incorporators are A. A. Gamache, A. N. P. Gendron and Cleo Beauchesne, all of Sherbrooke.

Nor-Mount Realty Company, Limited, has been incorporated with a capital stock of $400,000, to develop electricity or other power, to build roadways, etc., ond carry on business as general contractors, with head office at Quebec. The incorporators are F. X. Godbout, Ernest Roy and Romeo Langlais, all of Quebec City.

The Purdy & Henderson Company, Limited, has been incorporated with a capital stock of $200,000, to carry on business as civil engineers, architects and builders, etc., with head office at Vancouver. The incorporators are J. Rogers, W. O. Marble and W. Atkins, of Vancouver.

Boyle Concessions Limited has been incorporated with a capital stock of $750,000, to deal in timber, timber lands, etc., and carry on business as electricians and mechanical engineers, etc., with head office at Windsor. The incorporators are N. A. Bartlet, W. G. Bartlet and A. R. Bartlet, all of Windsor, One.

The Chelsea Park Realty Company, Limited, has been incorporated with a capital stock of $100,000, to construct buildings and carry on business as general land and building company, with head office at Montreal. The incorporators are W. W. Skinner, W. G. Pugsley, and G. G. Hyde, all of Montreal.

Burland Realty Company, Limited, has been incorporated with a capital stock of $50,000, to carry on business as a land and building company, with head office at Montreal. The incorporators are H. J. Elliott, L. A. David and G. L. Alexander, all of Montreal.

The Port Nelson Company, Limited, has been incorporated with a capital stock of $1,000,000, to manufacture and deal in lumber, pulp, paper, etc., to operate lumber and other mills, etc., with head office at Winnipeg. The incorporators are W. J. Johnston, P. J. Dixon, G. H. Dutton and others, of Winnipeg.

The Montreal House Construction Company, Limited, has been incorporated with a capital stock of $200,000, to carry on business as builders and contractors, etc., with head office at Montreal. The incorporators are A. Angers, T. M. Papineau, of Montreal, and A. R. McMaster, Westmount.

Frank A. Bowden & Sons, Limited, have been incorporated with a capital of $50,000, to carry on business as general contractors, real estate, etc., with head office at Toronto. The provisional directors are P. B. Wood, E. T. Coatsworth and A. H. McCrimmon, all of Toronto.

Miscellaneous

Alliston, Ont.

By-laws to raise $7,000 for waterworks extension and $5,000 for a bridge over the Boyne River will be submitted to the ratepayers June 24.

Cookshire, Que.

Sawmill of Robt. Westgate completely destroyed by fire with machinery, etc. Loss $7,000.

Cabot's
Shingle Stains

The first made, first in quality and first in the favor of those who have used them. Scientifically balanced formulæ, purest ingredients, no adulteration. The standard for 25 years.

Samples and Catalogue sent on request.

SAMUEL CABOT, Inc.
Manufacturing Chemists Boston, Mass.

Maxfield Parrish's Residence, Cornish, N.H.
Stained with Cabot's Shingle Stains

Can be Relied upon

to give fresh, artistic coloring effects and to wear as long as any colors can; to preserve the shingles thoroughly (Creosote) and not turn black or wash off. Every gallon guaranteed.

Canadian Agents:
Andrew Muirhead Co., TORONTO.
Seymour & Company, MONTREAL.
Henry Darling, VANCOUVER.
Canadian Equipment & Supply Co. CALGARY.

H. Longhurst F. E. Cooper J. V. Cuttriss

Hamilton Art Glass Co.
143½ King St. East, Hamilton, Ont.
Telephone 3537

Glass of all kinds and Patterns for Dwellings, Stores, Offices, Public Buildings and Churches.

Church and Domestic Art Glass
in Lead, Electroglazed and Copper Bar

Ornamental Chipped and Sand Cut Glass. Bevelled Plate and Mirrors. Plate and Window Glass

Tenders

A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

BAROMETRIC CONDENSERS

PROPERLY DESIGNED
TO EFFECT
SAVING OF STEAM

The John McDougall
Caledonian Iron Works Co. Limited

Works: MONTREAL. Sales Offices: MONTREAL. COBALT. TORONTO.
WINNIPEG. CALGARY. VANCOUVER.

WATER PURIFICATION

¶ This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
305 KENT BUILDING, TORONTO

The

Pioneer 30

"The Contractor's Ultimate Hauling Power"

Displaces Twenty Teams and a Troublesome Gang of Laborers.

The most powerful, durable tractor of the present day for hauling or road building work.

All roads and conditions look alike to the **Pioneer "30."** It has repeatedly proved itself to be cheaper and better than team haulage, not only on smooth surfaces and heavy grades, but for many freighting propositions where teams cannot be used.

The **Pioneer Tractor** is especially designed for heavy traction duty such as drawing cement, sand, coal, bridge timbers, bridge and structural steel, road graders and other road machinery.

Its three speeds forward make it possible to haul heavy loads for long distances with a lower consumption of gasoline than any other tractor made.

Mail the coupon for detailed description and further particulars.

The Pioneer Tractor Company, Limited

Shops and Head Offices:

Calgary - - Alberta

CUT OUT, SIGN AND MAIL:

THE PIONEER TRACTOR COMPANY, Limited

**Suites 201-202, Alberta Loan & Investment
Company Building, Calgary, Alta.**

Kindly mail me detailed description and full particulars of your Pioneer Thirty.

My name is.......... ....

My P. O. is. ....

My Province is..
(And duty)

C. R. & E. R. 6/5/12

Here's what the Owner says:

MIDWAY, N.D.

THE PIONEER TRACTOR CO., LTD.,
CALGARY, ALTA.

Gentlemen: I am sending you a photograph of the outfit that we had on the hauling contract out of Hope, N.D. With the five Winona Wagons we were hauling an average load of 25 tons, consisting of sand, cement and coal. The distance is about 20 miles and we made the round trip easily in 12 hours, this included unloading. The road was very heavy, owing to the rainfall of October and November, and full of heavy grades, but your three speeds forward made it possible to haul a full load all the way—the low gear for the heavy grades, etc. The one speed tractors could have loaded only for the heaviest grade. I used about 60 gallons of gasoline per trip, 20 miles with load and return and made 32 trips without an accident of any kind—over 1,200 miles in 32 days.

Muir Brothers of Hunter, N.D., had two Pioneers on the job and they also are of the opinion that for a freighter proposition, **The Pioneer "30" has them all beaten seven ways from Sunday.**

Very truly yours,

E. R. LOOMIS.

Shops: Victoria Square,
CALGARY, ALBERTA.

REVERSIBLE
10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line **2,600 Lbs.**

On a Double Line will Lift **5,200 Lbs.**

160 Feet per Minute
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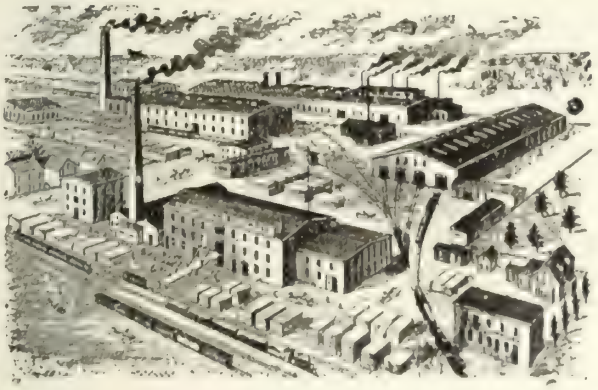

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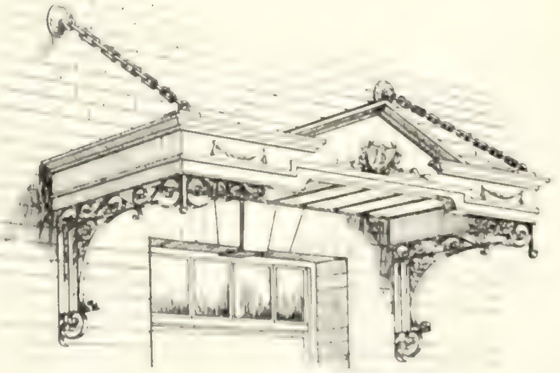

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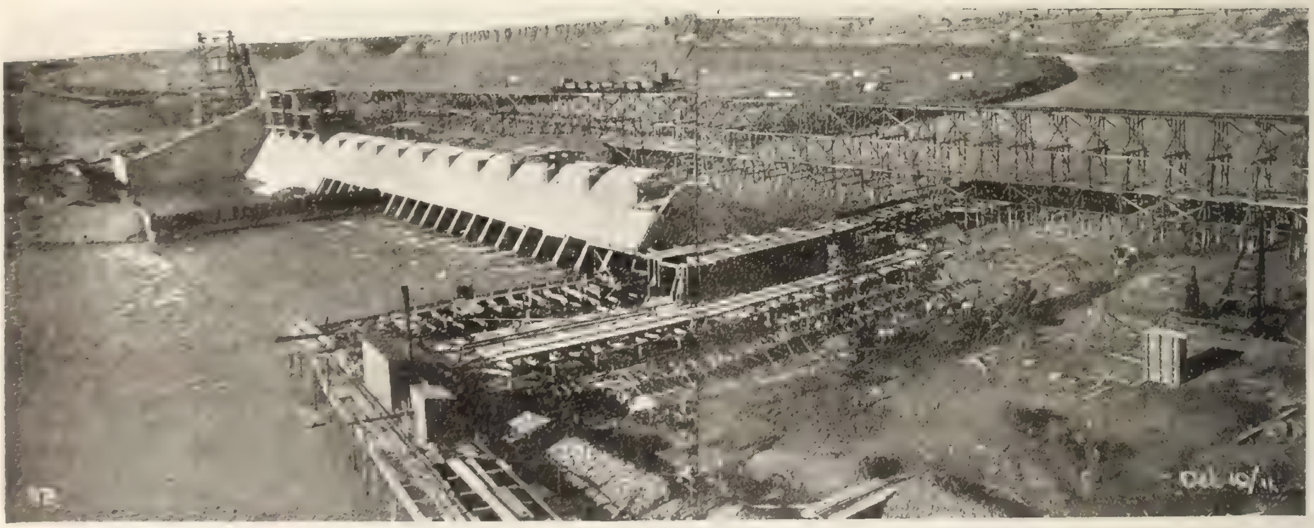

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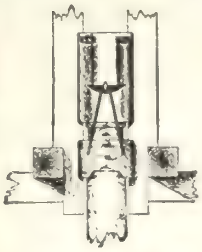

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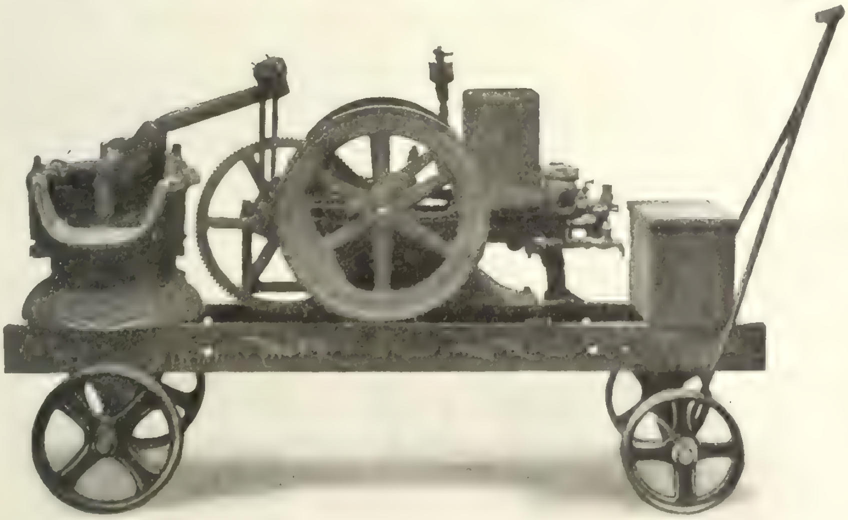

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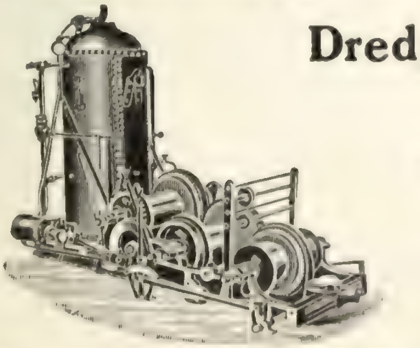

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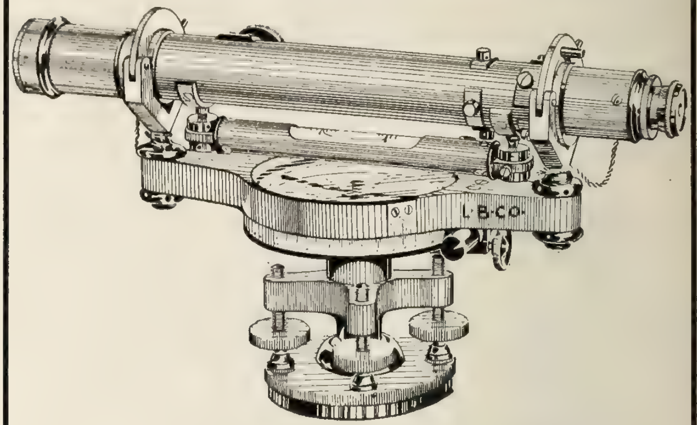

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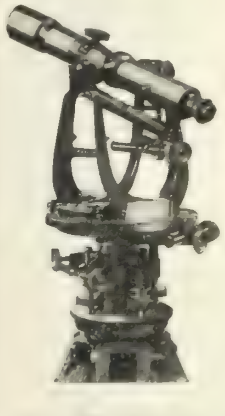

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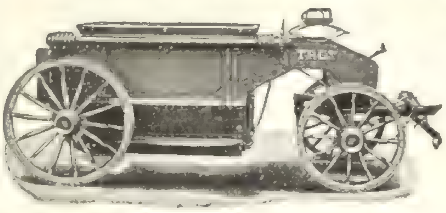

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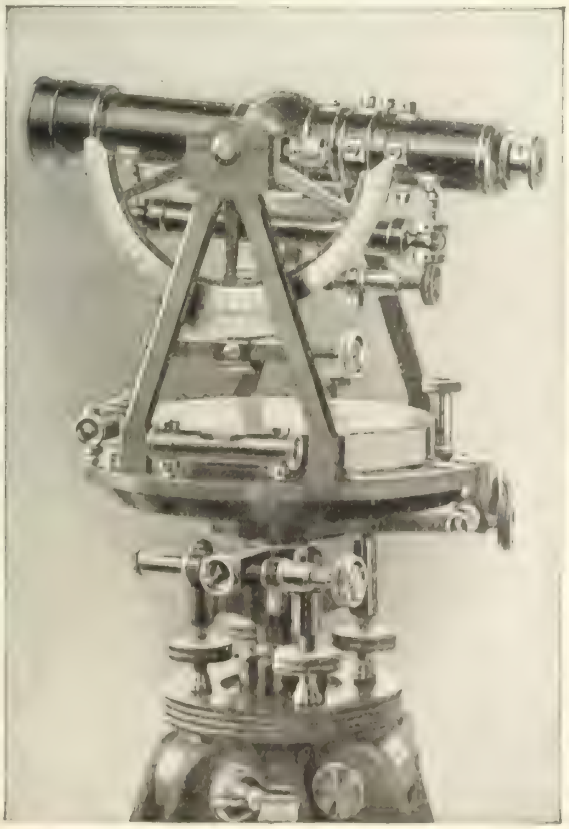

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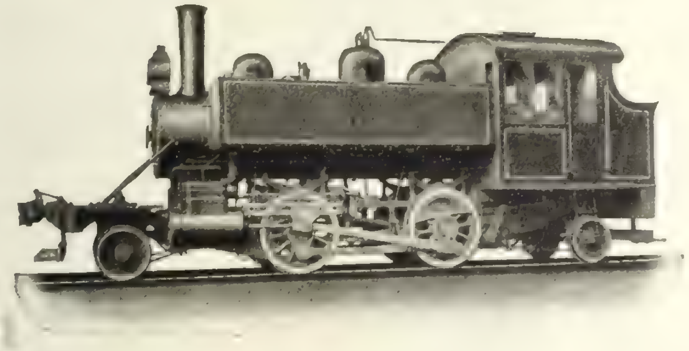

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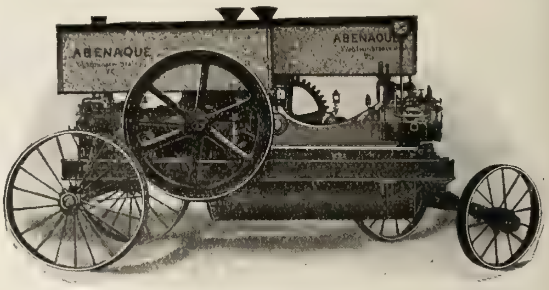

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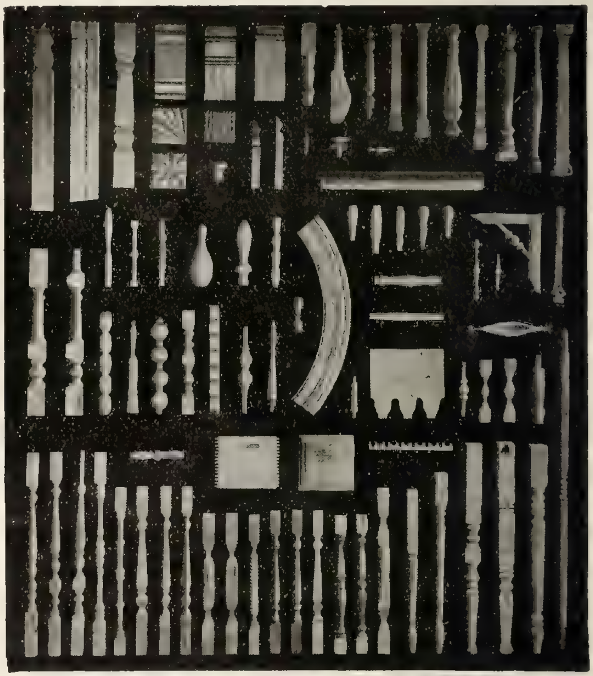

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FIRE BRICK **IVORY CEMENT PLASTER**

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The Contractors' Supply Co., Limited
Manning Chambers, Toronto Tel. M. 6859

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 and 30 per cent. for approved specifications:—

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.05	$4.40
40	3.25	4.75
50	3.65	5.55
60	3.90	6.00
70	4.15	6.50
80	4.65	7.00
85	5.10	7.85
90		9.10
95		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 and 5 per cent.

High grade compression work, 56 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 60 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe

Lead pipe, 20 per cent. off; lead waste, 20 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)		Black			Galvanized
¼ inch	....	$1.87	¼ inch	....	$2.70
⅜ "	....	1.87	⅜ "	2.70	2.57
½ "	2.47	2.35	½ "	3.40	3.23
¾ "	2.88	2.75	¾ "	4.03	3.83
1 "	4.13	3.93	1 "	5.78	5.48
1¼ "	5.63	5.35	1¼ "	7.88	7.49
1½ "	6.75	6.44	1½ "	9.45	8.98
2 "	8.46	8.05	2 "	12.06	11.46
2½ "	13.51	12.85	2½ "	19.26	18.30
3 "	17.74	16.86	3 "	25.29	24.03

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.45.

Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 38 cents.

Plaster of Paris, per barrel, delivered, $3.10.

Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $7.25 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, $1.01 per gallon of 9 lbs.

Raw Linseed Oil, in barrels, 98c. per gallon of 9 lbs.

Turpentine, in barrels, 70c. per gallon.

Pure Red Lead, dry, $6 to $7 per 100 lbs.

New Companies

Earlcourt Realty Company Limited has been incorporated with a capital of $50,000, to carry on a general land and building business with head office at Ottawa. The provisional directors are J. I. MacCracken, A. E. Maxwell, V. V. Rogers and D. J. McDougal, all of Ottawa.

Canadian Real Estate Exchange, Limited, has been incorporated with a capital of $50,000, to carry on business as timber and lumber dealers, sawmill proprietors, etc., with head office at Toronto. The provisional directors are Roy Armstrong, Junior H. Scott and Jas. Noon, all of Toronto.

The National Sand and Material Co., Ltd., has been incorporated with a capital of $40,000, to manufacture and deal in all kinds of brick, sand, lumber, and general builders' supplies, with head office at Welland, the provisional directors are John Gardner, D. F. Fowler and L. C. Raymond, all of Welland.

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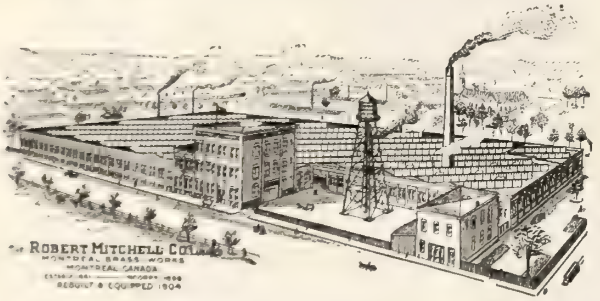

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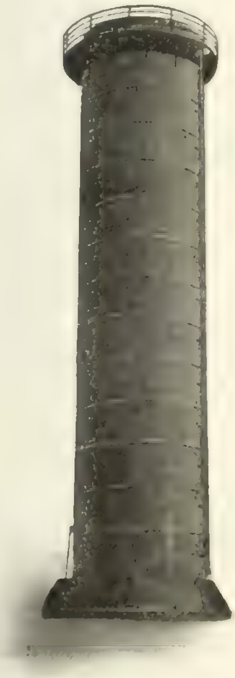

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with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

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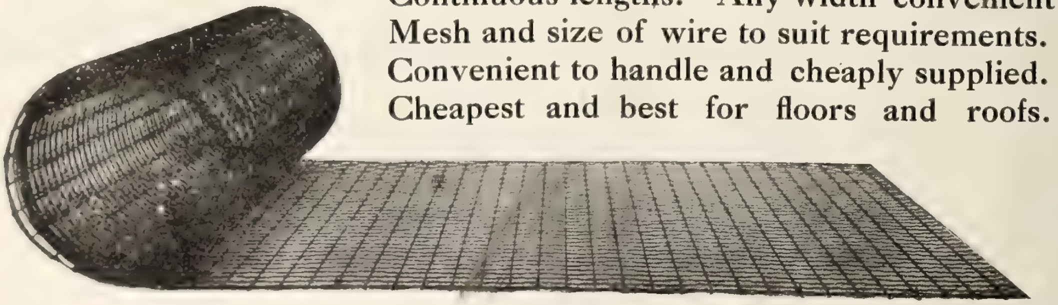
Steel Wire Reinforcing

Continuous lengths. Any width convenient to handle.
Mesh and size of wire to suit requirements.
Convenient to handle and cheaply supplied.
Cheapest and best for floors and roofs.



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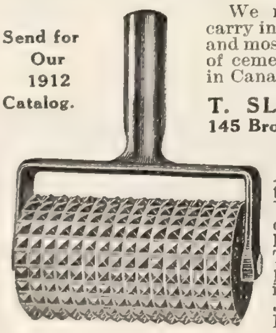

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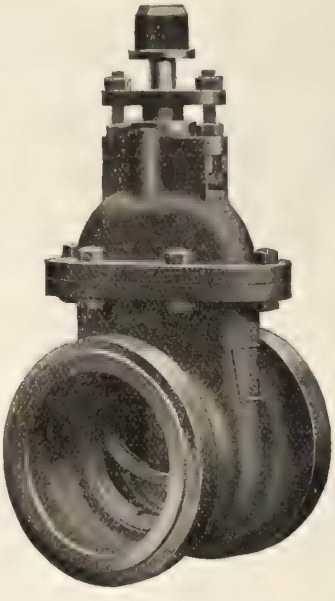
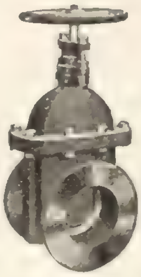


WATERWORKS



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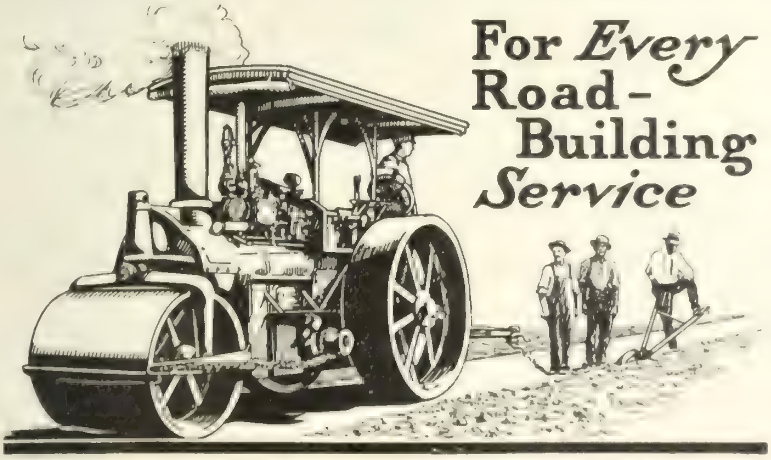

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BULLETIN No. 301

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Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete.

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
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Use Herringbone Metal Lath

behind radiators. Steam will warp wood lath and crack the plaster.

Why Herringbone?

Because it is stiff enough to span sixteen inches. No special stud framing is necessary.

There are seven other reasons equally good.

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Metal Shingle and Siding Co., Manufacturers

A Great Favorite

The man who knows a good thing when he sees it, and who wants a good thing when he hears of it, is the man who will insist upon having

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Architects and contractors who cater to this class of men will be acting directly in their own interests by specifying this brand

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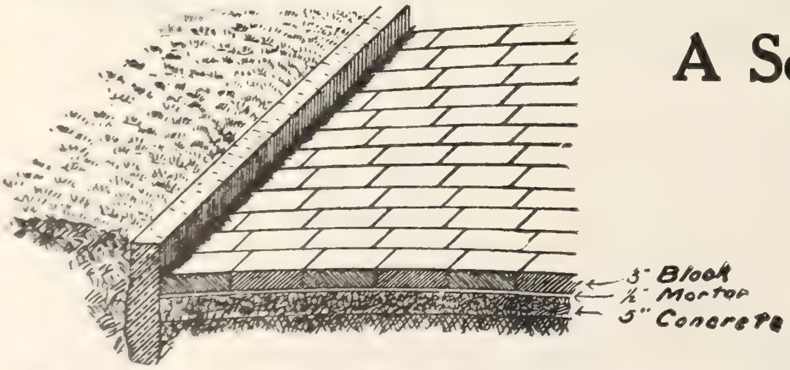

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Non-Absorbent and nearly Noiseless.
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Easily Repaired and Easily Cleaned.

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Send for Descriptive Literature

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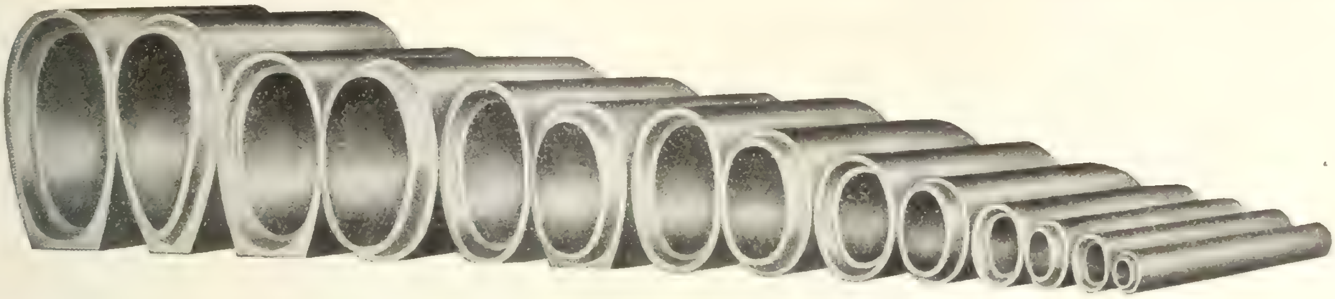

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properly built of properly made

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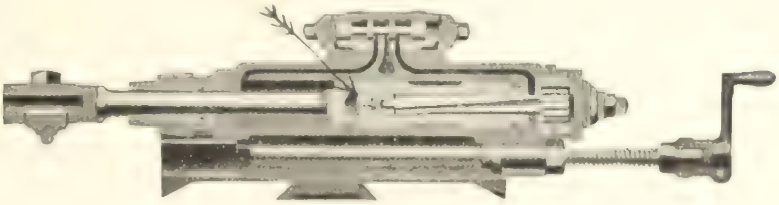
The McKiernan-Terry "Wizard" rock Drill is the last word in a piston rock drilling machine.

It has an air cushioning device on the end of the rifle bar.



It was found by exhaustive tests that a drill equipped with this device would use 25% less compressed air, and strike about 50% more blows per minute.

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IMPERVITE

TRADE MARK REGISTERED

Authorities agree that even under the best conditions a well-made concrete cannot be regarded as waterproof.

Yet the presence of water in the concrete mass induces grave structural weaknesses, such as the destruction of the reinforcing metal and the splitting of the concrete through electrolysis, and the cracking caused by the freezing of absorbed water. In addition there is usually a hygienic necessity that the wall exclude the water.

By several years of difficult practical work it has been proved that IMPERVITE is the best waterproofing compound known for use in concrete or cement mortar.

IMPERVITE is a soluble paste manufactured in a neutral color and various tints, including ***terra-cotta, green, brown, slate, etc.*** It consists of a bituminous material ground with mineral oxides in water, forming an emulsion that mixes readily with the water used in mixing the concrete.

When the mortar sets, a chemical action takes place whereby it becomes harder than ordinary concrete, and the bituminous material, filling the voids in the concrete, effectually prevents the water from penetrating.

IMPERVITE should be used in underground walls, tanks, dams, reinforced concrete, stucco and many other forms of concrete work. Write for Booklet giving full particulars about this most successful waterproofing compound, to

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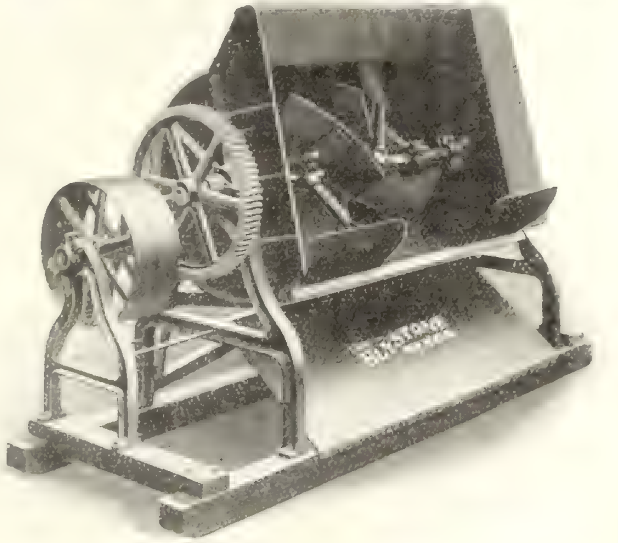

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Easy to work Easy to Clean High efficiency Low cost

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The Lautz Company

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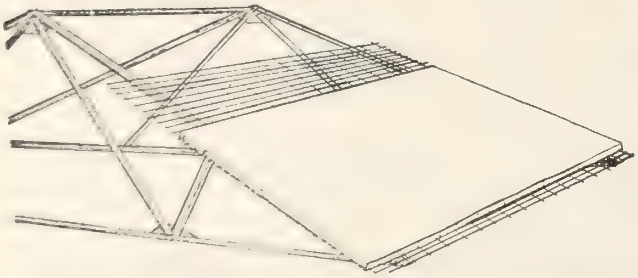

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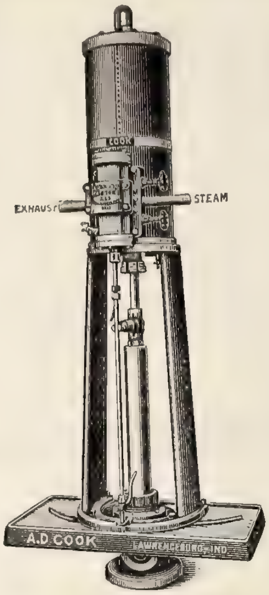

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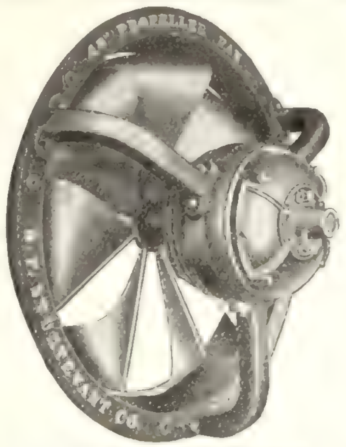

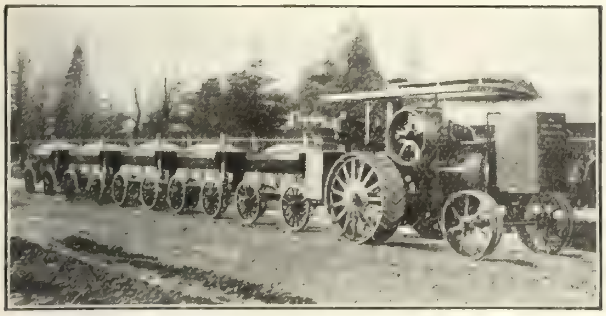

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Will do more work per capacity in hard materials than any other bucket.

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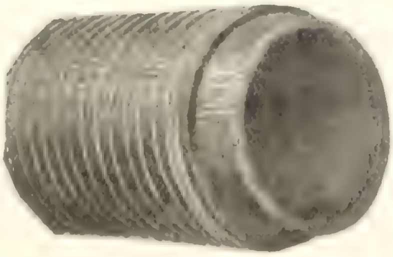

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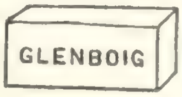

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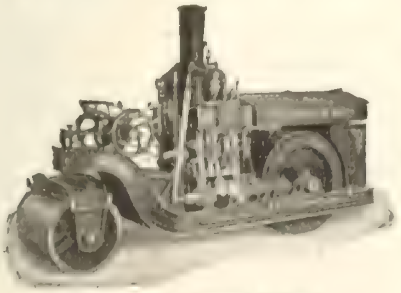
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Vol. 26 Toronto, June 12, 1912 No. 24

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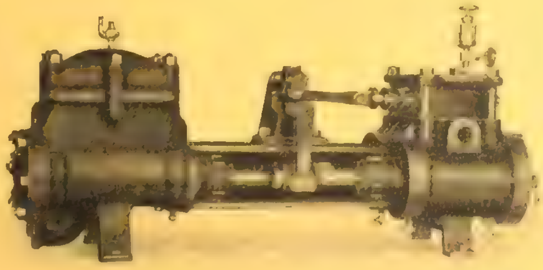

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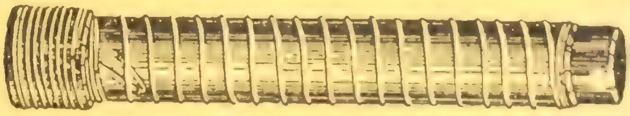

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Classified Directory to Advertisements, Page 6

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The contractors have been piling up profits with this machinery for two years and it's as good as new to-day,

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"Factories and Warehouses of Concrete"

THIS handbook of practical information on modern fireproof construction was compiled—at great expense—to fill a real want, to supply reliable data on a subject in which every architect, engineer, contractor or prospective builder is intensely interested.

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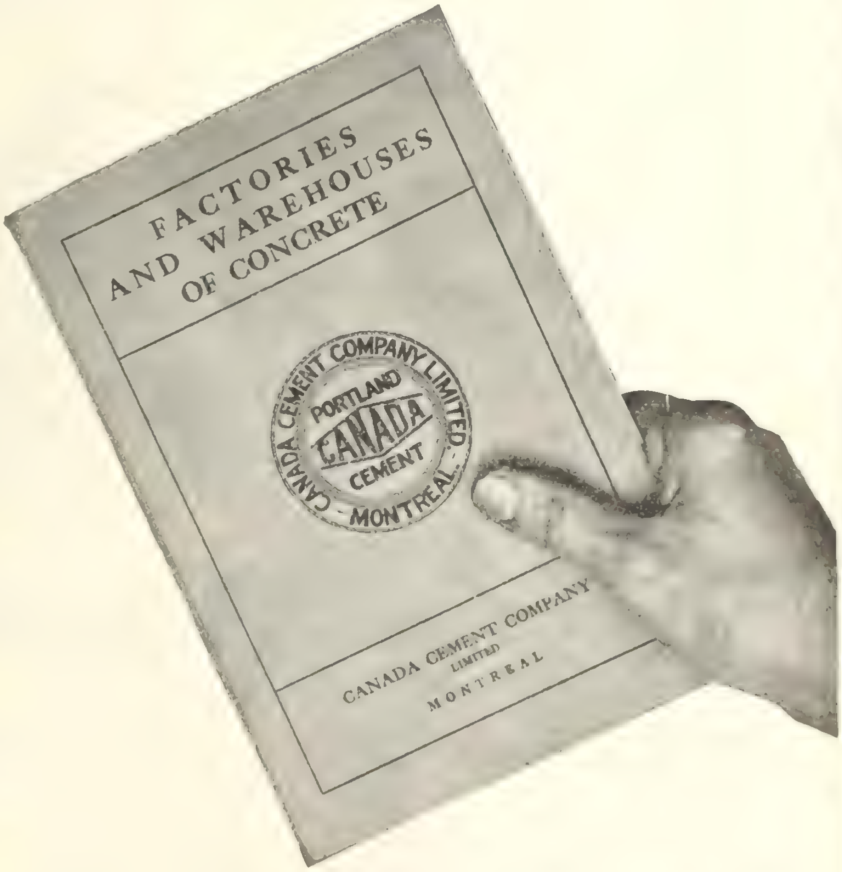

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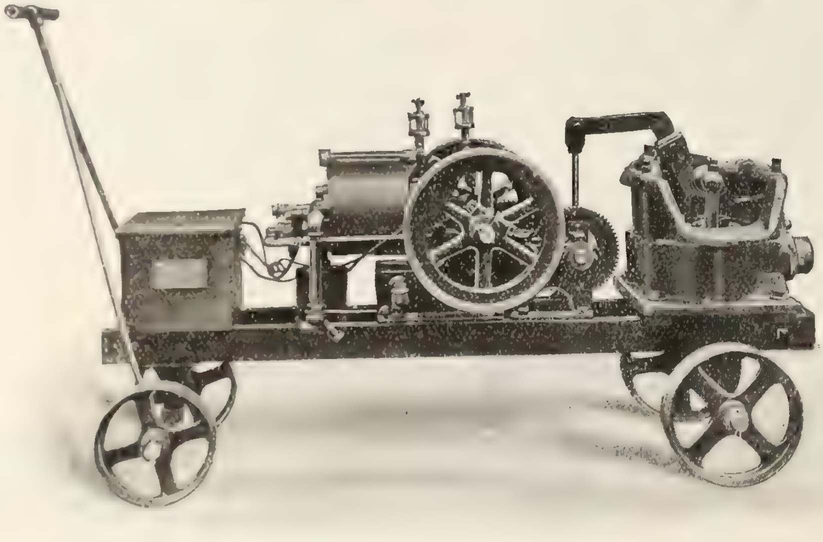

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Capacity 3000 to 4000 Gals. Per Hour

We can sell you the complete outfit or we can send you the Engine on skids or trucks and you can fit your own Diaphragm Pump to it.

They Pay for Themselves by the Saving in Labor

We Also Have Them Double-Acting

(As Shown Here)

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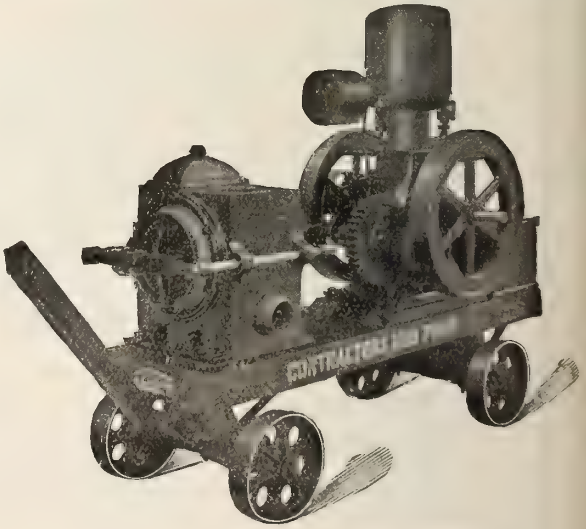

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Will Raise Water 150 Feet

No Engine or
Tricky Machinery
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  Port Credit Pressed Brick Co.

Brick Chimneys
  Canadian Kellogg Co.
  Douglas Milligan Co.
  Heinicke, H. R.

Brick Machinery and Supplies
  Whitehead, John

Bridges (Steel)
  Canadian Bridge Co.
  Des Moines Bridge and Iron Co.
  [illegible] Bridge Works
  Dominion Bridge Co.
  Hunter Bridge & Boiler Works
  Mackinnon-Holmes & Co.
  McNeil & Co., W. P.
  National Bridge Co.
  Phoenix Bridge & Iron Works
  Sarnia Bridge Co.
  Structural Steel Co.

Buckets
  American Hoist & Derrick Co.
  Andresen, H. P.
  Browning Engineering Co.
  Canadian Fairbanks
  Owen Bucket Co.
  Thew Shovel Co.

Cable
  Canada Wire & Cable Co.
  Factory Products
  Standard Underground Cable Co.
    of Canada Limited.

Cement
  Alsen Portland Cement Co.
  Britnell & Co.
  Bremner, Alex.
  Canada Cement Co.
  McNally & Co., W.
  Morrison & Co., T. A.
  Ontario Lime Association
  Rogers, Alfred Limited
  Smyth & Ryan

Cement Tools
  Slack, T.

Coal Chutes
  Down Draft Furnace Co.

Coal Handling Apparatus
  American Hoist & Derrick Co.
  Browning Engineering Co.
  Brown Hoisting Machinery Co.

Concrete Mixers and Machinery
  Austin Drainage & Excavator Co
  Blystone Machinery Co.
  Canada Foundry Co.
  Chain Belt Company
  General Machinery Co.
  Hopkins & Co., F. H.
  Jenckes Machine Co.
  Koehring Machine Co.
  London Concrete Machinery Co.
  Mun. Engineering Contracting
    Company
  Mussens Limited
  Morrison & Co., T. A.
  Standard Scale & Supply Co.
  Wettlaufer Bros.

Conduits
  Can. H. W. Johns-Manville Co.
  Conduits Co., Limited

Contractors
  Bain & Ross
  Bennett, Robt.
  Eastern Pipe Construction Co.
  Foundation Co.
  Holmes, Fred.
  McKnight Construction Co.
  Norcross Bros. Co.

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  American Hoist & Derrick Co.
  Bates & Edmonds
  Beatty & Sons, M.
  Douglas Milligan Co.
  Browning Engineering Co.
  Brown Machine Co.
  Cleveland & Erie Mach. Co.
  Doty Engine Works Co.
  General Supply Co.
  Harris Mfg. Co., J. W.
  Hepburn, John T.
  H. & E. Lifting Jack Co.
  Hopkins & Co., F. H.
  International Marine Signal Co.
  Johnston & Chapman
  Lecky & Collis.
  Marsh & Henthorn
  Montreal Locomotive Works
  Mussens Limited
  Pioneer Tractor Company.
  Stinson-Reeb Builders Supply Co
  Tidewater Iron Works
  Tiffin Wagon Co.
  Toledo Wheelbarrow Co.
  Turner & Sons, J. J.
  Urschel Bates & Co.
  Vulcan Iron Works
  Watson Wagon Works

Core Drills
  Canadian Rand Co

Corrugated Iron
  Can. H. W. Johns-Manville Co.
  Galt Art Metal Co.
  Metallic Roofing Co.
  Ormsby, A. B., Limited

Cranes, Travelling and Locomotive
  Browning Engineering Co.
  American Hoist & Derrick Co.
  Brown Hoisting Machinery Co.
  Willis Shaw Machine Co.

Creosote Stains
  Cabot, Inc., Samuel

Crushed Stone and Granite
  Sand and Supplies
  Smyth & Ryan

Crushers (Stone and Rock)
  Chalmers & Williams
  Hopkins & Co., F. H.
  Jenckes Machine Co.
  London Concrete Machinery Co.
  Mussens Limited
  Morrison & Co., T. A.
  Universal Crusher Co.
  Willis Shaw Machine Co.

Derricks and Derrick Fittings
  American Hoist & Derrick Co.
  Hepburn, John T.

Dredges
  Beatty & Sons, M.
  Browning Engineering Co.
  Willis Shaw Machine Co.

Drills
  Beatty & Sons, M.
  Canada Foundry Co.
  Canadian Rand Co.
  Lecky & Collis.

Drilling Contractors
  Harvey, J.

Dump Cars, Wheels, etc.
  General Supply Co.
  Smith Foundry Co.

Electrical Machinery and Supplies
  Factory Products
  Mitchell Co., Robt.

Engines
  Berg Machinery Co.
  Canadian Boving Co.
  Ford Iron Co.
  Inglis, John
  Jenckes Machine Co.
  Laurie & Lamb
  Leonard & Sons, E.
  McDougall Caledonian Iron Wks
  Mussens Limited
  Sturtevant Co., B. F.
  Waterous Engine Works Co.

Engineers (Civil) and Mechanical
  Barber & Young
  Bowman & Connor
  Chipman & Power
  Farmer, John T.
  Fuce, Edw., O.
  Galt Engineering Co., John
  Hancock, H. Syd.
  Inglis, John
  Kennedy, Jas. C.
  Lea & Ferguson
  Mace, T. Harry
  Mitchell, C. H.
  Taylor, James

Excavating Machinery
  Austin Drainage Excavator Co.
  Harris Mfg. Co., J. W.

Exhaust Heads
  Sturtevant Co., B. F.

Field Instruments
  Beckman Co., L.
  Buff & Buff Mfg. Co.
  Consolidated Optical Co.
  Eaton Company, T.
  Gurley, W. & L. E.
  Watts & Son, E. R.
  Ainsworth, Wm. & Sons

Filters
  American Water Softener Co.

Filtration Plants
  Bell Filtration Co.

Fire Brick
  Gibb, Alexander
  Improved Equipment Co.
  Ontario Lime Association
  Smyth & Ryan

Fireproof Doors and Windows
  Dahlstrom Metallic Door Co.
  Mussens Limited
  Ormsby, A. B.
  Steel & Radiation Ltd.

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  Consumers Gas Co.

Gas Machinery
  Improved Equipment Co.

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  Cloisonne Glass Co.
  Consolidated Glass Co.
  Colonial Glass Co.
  Hamilton Art Glass Co.
  Hobbs Mrg. Co.
  Luxfer Prism Co.
  Thompson, B. & S. H.
  Toronto Plate Glass Imp't'g Co.

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  Dominion Marble Co.
  Lautz Company.
  Missisquoi Marble Co.

Hammer Drills
  Canadian Rand Co.

Heating Apparatus
  Jenckes Machine Co.

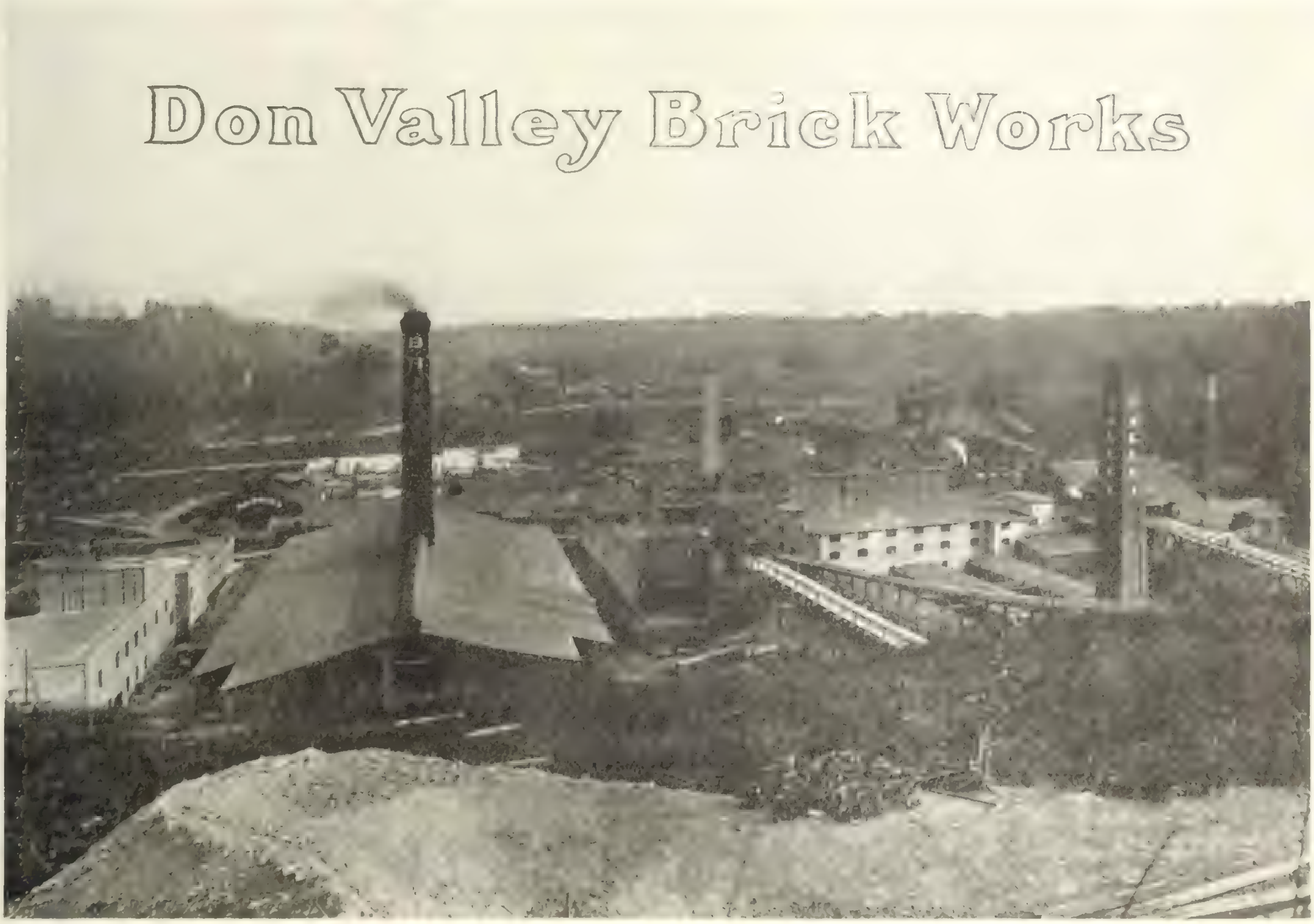
High Pressure Pipe Lines
  Canadian Boving Co.
  Escher Wyss & Co.

Hoisting Apparatus
  Abenaque Machine Works
  American Hoist & Derrick Co.
  Bates & Edmonds
  Beatty & Sons, M.
  Browning Engineering Co.
  Doty Engine Works Co.
  Ford Iron Co.
  Factory Products
  Inglin, John
  Jenckes Machine Co.
  Hopkins & Co., F. H.
  Lecky & Collis.
  Marsh & Henthorn
  Mussens Limited
  Sturtevant Co., B. F.

Hydrants
  Canada Iron Corporation
  Ford Iron Co.
  Gartshore-Thomson Pipe Co.
  Kerr Engine Co.

(Continued on page 12)

DON VALLEY BRICKS



Porous
Terra-Cotta
Fire Proofing

Foundation
Bricks

The factor which often determines the value of a brick for structural purposes is its cheapness, but there are three considerations which are of infinitely greater importance, viz., durability, strength and beauty.

Don Valley Bricks

are produced on the most scientific lines and are renowned for their unusual strength which makes them adaptable to conditions where they are exposed to mechanical violence or unusual wear. *Don Valley Bricks* have been put to the test in hundreds of buildings, and the question of endurance under the action of weather and other forces leaves not a shadow of doubt as to their durability. Their beauty is also of supreme importance to the architect as it permits an infinite variety of pleasing and artistic effects.

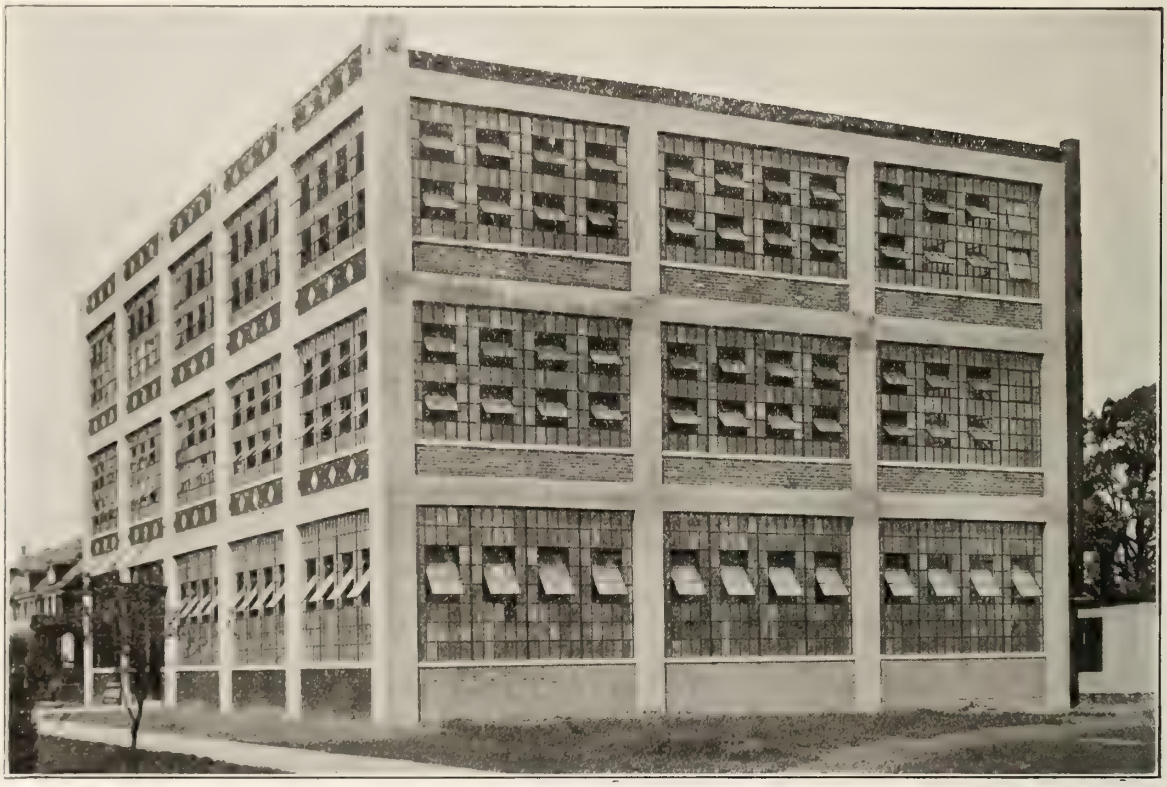
Facing
Bricks
and
Enameled
Bricks

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO
Montreal Agent: David McGill, 83 Bleury Street

Increase Your Production
Reduce Your Costs

Light - Ventilation - Low Upkeep



One of the many buildings in Canada equipped throughout with **"Fenestra"** Solid Steel Windows.

Is first cost in your Window Sash everything?

How about second, third,—tenth costs?

Future Upkeep—that's the point!

See to it that your architect gives you clear, positive facts and figures on sash upkeep.

Remember we're right here to give you, or your architect, all the facts about **"Fenestra"** Solid Steel Windows and Ventilators.

Consult us before settling the all-important question of window requirements. Then you can make your comparison of all types of windows intelligently and completely.

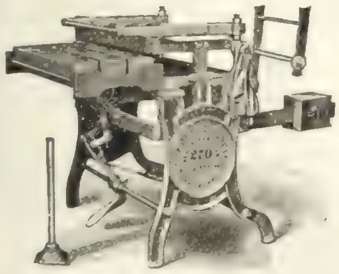
"FENESTRA" Solid Steel Windows

For Factories, Foundries, Power Houses, Garages, Prisons, Asylums, etc.

STEEL and RADIATION, Limited
Toronto, Canada

CONCRETE MACHINERY

For all classes of work



Cement Brick Machine

We are the only large manufacturers in Canada who specialize.

That is why we are able to supply the contractor with his every requirement, in Machinery for the working of Concrete. Nothing counts like THE PRODUCTION ON A LARGE SCALE.

Lawn Vases

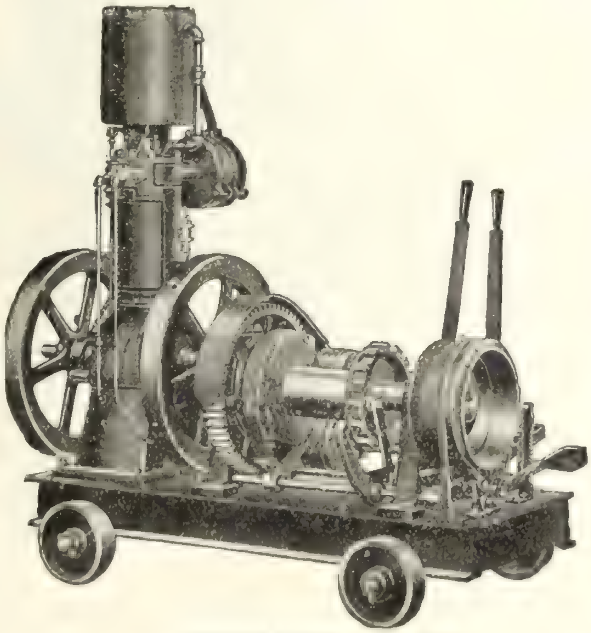
CONTRACTOR

TELL US YOUR

REQUIREMENTS

ASK FOR 1912

CATALOGUE



Builder's Double Acting Hoist

THE LONDON MACHINES are doing ALL WE CLAIM for them.

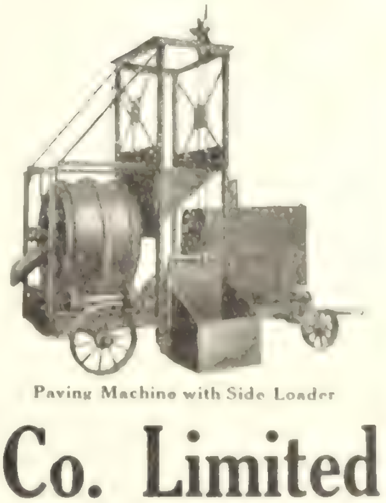
While we are BUILDING MACHINES we are BUILDING our REPUTATION.

THE ENORMOUS SALE of OUR MACHINES is sufficient proof to us that it pays to build machines of the VERY BEST TYPE.

The CHEAP article we do not make.

Standard Drum Batch Mixer

We manufacture a full line of CONCRETE MACHINERY and Cement WORKING TOOLS, also CONTRACTOR'S MACHINERY and EQUIPMENT.



Paving Machine with Side Loader

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

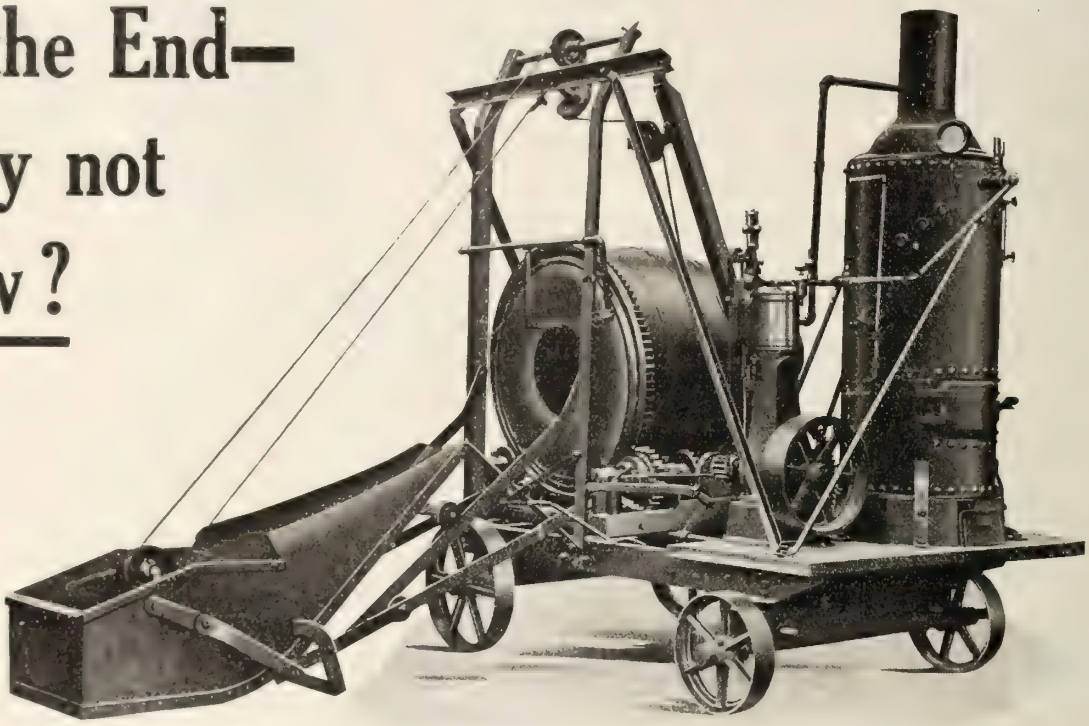
Toronto Office : N.E. Cor. Richmond & Bay Sts. **Winnipeg Office : 445 Main St. Winnipeg, Man.**

AGENTS :—

The Foss & Hill Machinery Co., Montreal, Que.
Hamilton Machinery Co., Calgary, Alta.
G. B. Oland, Halifax, N. S.
B. C. Equipment Co., Vancouver, B. C.

We are the Largest Manufacturers of Concrete Machinery in Canada

It will Mean a "Wettlaufer Heartshape" In the End—Why not Now?



The Time to Save Money on a Concrete Mixer is NOT WHEN You Buy---BUT AFTER

Prices on "Wettlaufer Heartshape" Mixers will compare very favorably with any mixer on the market. To the enormous advantages to be gained by using a "Wettlaufer Heartshape", add the saving of time and money for every days' work it does—there is your reason for investigating the merits of this Mixer. There is no flimsiness either in our selling talk or in the machine. Our arguments are hard facts—we can prove every one. The selling points are right there on the Mixer—you can see them for yourself.

The above illustration shows our No. 3 Improved "Heartshape" Road Mixer. There are hundreds of this particular design Mixer at present in use and the entire satisfaction it has given in every case gives conclusive proof of its efficiency. We have the figures of numerous firms that show that this mixer has effected a direct saving over all other methods.

The Economy of Operation

Automatic controlled. One man operates the entire machine.

Quick Work

each revolution of the HEARTSHAPE DRUM turns the batch end for end thus ensuring a quick and positive mix.

Long Life—No Breakdowns

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

WETTLAUFER BROS.

FACTORIES : **Mitchell, Ont.** **Buffalo, N. Y.** **Detroit, Mich.**

AGENCIES :

A. R. Williams Machinery Co.
15 Dock St. St. John, N. B.

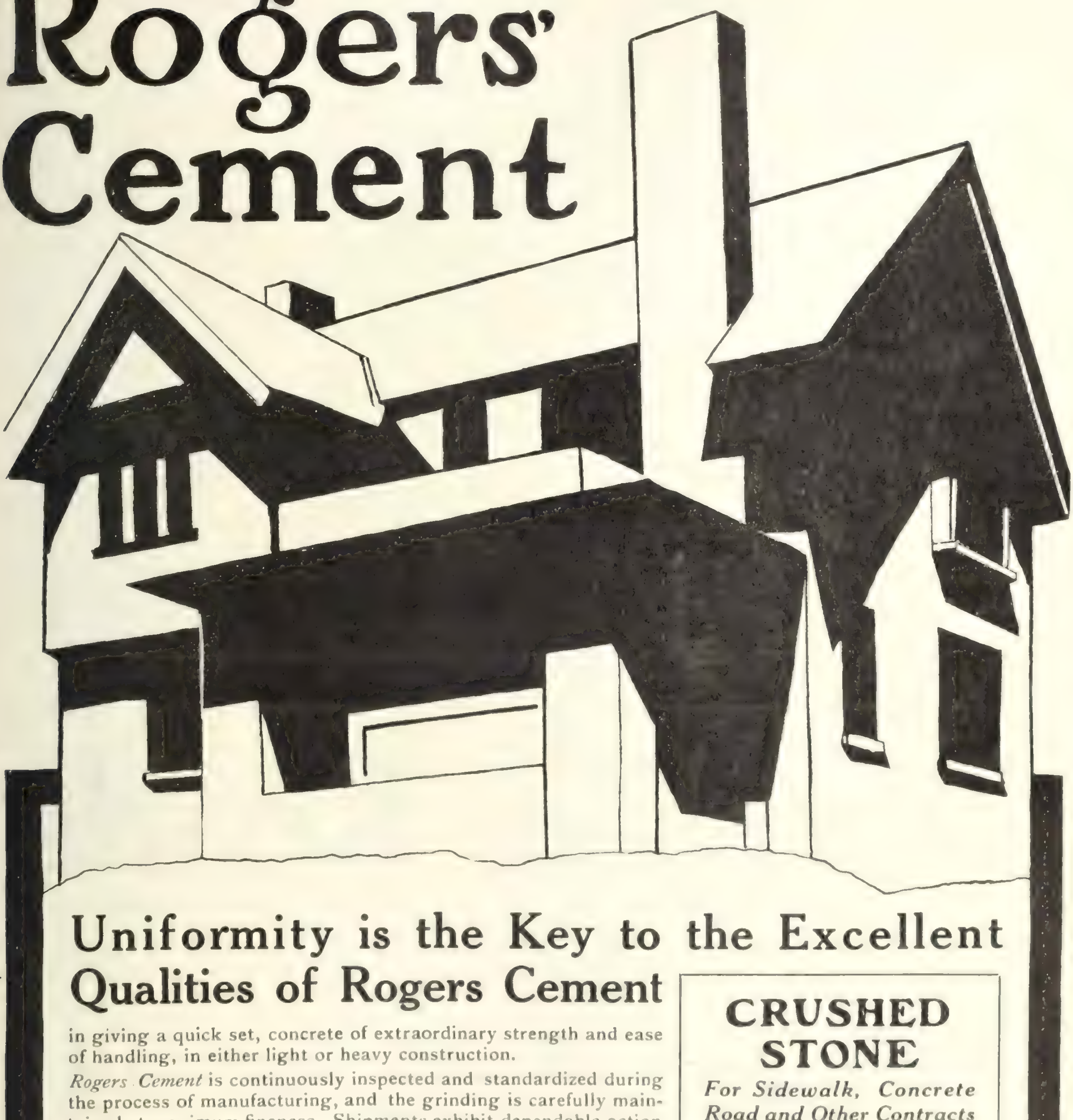
Lavallee Ross, Limited
Alexandra Block, Howard Ave.
Edmonton, Alta.

Hooton & Moore
710 Builders' Exchange, Portage Ave.,
Winnipeg, Man.

MONTREAL OFFICE and WAREROOMS : **316 Lagauchetiere St. W.**

Head Office : Toronto, Ont., 178 Spadina Ave.

Rogers' Cement



Uniformity is the Key to the Excellent Qualities of Rogers Cement

in giving a quick set, concrete of extraordinary strength and ease of handling, in either light or heavy construction.

Rogers Cement is continuously inspected and standardized during the process of manufacturing, and the grinding is carefully maintained at maximum fineness. Shipments exhibit dependable action in the forms, and the great covering power reduces the time of mixing.

By specifying *Rogers Cement* the engineer or builder procures a dependable concrete, and the contractor has the benefit of completing his work satisfactorily and without undue delays.

ALWAYS SPECIFY ROGERS CEMENT

Mills at Atwood, Hanover, Kirkfield, Orangeville, Owen Sound, St. Marys and Wiarton

CRUSHED STONE

For Sidewalk, Concrete Road and Other Contracts

WE can furnish crushed stone in all sizes, clean and free from dust, dirt and mold, and evenly graded.

We can guarantee delivery in any quantity. Write, phone or wire your orders.

Plants at Dundas and Vinemount

Alfred Rogers Limited - 28 King St. West, Toronto

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Toronto Furnace Co.

Insulating Compounds
Standard Underground Cable Co of Canada, Limited

Interior Finish and Doors
Batts Limited
Bryan Mfg. Co.
Canada Office & School Fur. Co.
Georgian Bay Shook Mills
Oshawa Int. Fittings Co.
Rhodes Curry & Co.

Kilns
Sturtevant Co., B. F.

Lime
Christie, Henderson & Co.
Jamieson Lime Co.
Ontario Lime Association

Lime Kilns
Improved Equipment Co.

Locomotives
Canadian Boving Co.
Montreal Lomomotive Works
Canada Foundry Co.

Metal Lath
Galt Art Metal
Greening Wire Co., B.
Metallic Roofing Co.
Noble, C. W.
Pedlar People
Steel & Radiation Ltd.

Metal Forms
Hotchkiss Lock Metal Form Co.

Meters, Water
Buffalo Meter Co.
Hopkins & Co., F. H
McDougall Caledonian Iron Wks
Neptune Meter Co.
Union Water Meter Co.

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Packings and Pipe Coverings
Garlock Packing Co.

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Elaterite Paint Co.
R.I.W. Damp Resisting Paint Co
Standard Paint Co.

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Dominion Creosoting Company
Metropolitan Paving Brick Co.
Ontario Asphalt Block Co.
Paterson Mfg. Co.

Perforated Metals
Greening Wire Co., B.
Johnson & Chapman Company

Pipe
American Spiral Pipe Works
Canadian Pipe Co.
Dominion Concrete Co.
Eastern Pipe & Construc'n Co.
Gartshore-Thomson Pipe Co.
Munderloh & Co.
National Iron Works
Pacific Coast Pipe Co.
Pedlar People
Piggott & Co., Thos.
Steel Co. of Sarnia

Pile Driving Machinery
American Hoist & Rerrick Co.
Browning Engineering Co.
Canadian Rand Co.
Vulcan Iron Works

Plaster
Albert Mfg. Co.
Britnell & Co.
Ontario Lime Association

Plug Drillers
Canadian Rand Co.

Plumbers' Supplies
Standard Ideal Co.

Pneumatic Machinery
Canadian Rand Co.

Portable Saws
Canadian Fairbanks

Power Engines
Inglis Co., John

Pumps and Pumping Machinery
Abenaque Machine Works
Bates & Edmonds
Beatty & Sons, M.
Canada Foundry Co
Canadian Boving Co.
Canadian Rand Co.
Cook, A. D.
Escher Wyss & Co.
General Supply Co.
Hopkins & Co., F. H.
Inglis Co., John
McDougall Caledonian Iron Wks
Smart-Turner Machine Co.
Waterous Engine Works Co.
Mussens Limited
Ontario Wind Eng. & Pump Co.

Quarry Machinery
Canadian Rand Co.
Improved Equipment Co.
Johnston & Chapman
George Anderson & Co.

Railway Supplies
Gartshore, John J.
Hopkins & Co., F. H.
Mussens Limited

Reinforcements, Concrete & Steel
Ambursen Hydraulic Cons. Co.
Canada Steel Co., Ltd.
Canada Wire & Iron Goods Co.
Factory Products
Greening Wire Co., B.
Leach Contracting Co.
Steel Co. of Canada
Steel & Radiation Ltd.
Trussed Concrete Steel Co.
Turner, C. A. P.

Revolving Stone Screens
Greening Wire Co., B.
Johnson & Chapman Co.

Road Machinery
Erie Machine Shops
Hamilton Machinery Co.
Huber Manufacturing Co.
Morrison & Co., T. A.
Mussens Limited
Western Wheeled Scraper Co.
Waterous Engine Works Co.

Roofing Materials
Asbestos Mfg. Co.
Can. H. W. Johns-Manville Co.
Canadian Supply Company
Galt Art Metal Co.
Metallic Roofing Co.
Noble, Clarence W.
Paterson Mfg. Co.

(Continued on page 14)

Durable Roads

For the **highest efficiency** in waterproof macadam road construction—for the most durable, dustless, waterproof, trafficproof roads at the **lowest cost** per mile per year of service—engineers should specify

"Pioneer" Road Asphalt

Road experts everywhere are enthusiastic over their success with "PIONEER."

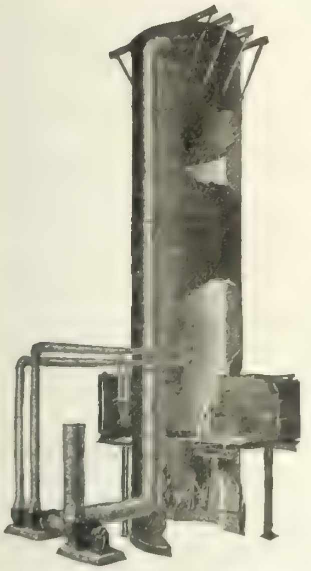
If interested in **durable** road construction write us for specifications and data.

Build up your old macadam roads by using **"Pioneer" Road Surface Asphalt.** Makes a smooth, rubbery surface—and one application will lay the dust for an entire year! Write for specifications on **Road Surface Asphalt,** also on **"PIONEER" Filler Asphalt and "PIONEER" Paving Cement.**

The Canadian Mineral Rubber Company, Ltd.

503 Canada Building, WINNIPEG

LIME MAKING ECONOMY



Present-day competition demands up-to-date equipment to bring manufacturing costs to the lowest limit.

In designing our lime kilns we have embodied every feature looking toward low cost in lime making.

Economical lime production is a question of the proper use of fuel. And our experience as combustion engineers enables us to furnish equipment which will give the largest output of high-grade lime per pound of fuel burned.

We furnish kilns using either wood, coal, oil, or natural or producer gas as fuel. Write for Bulletin No. 4.

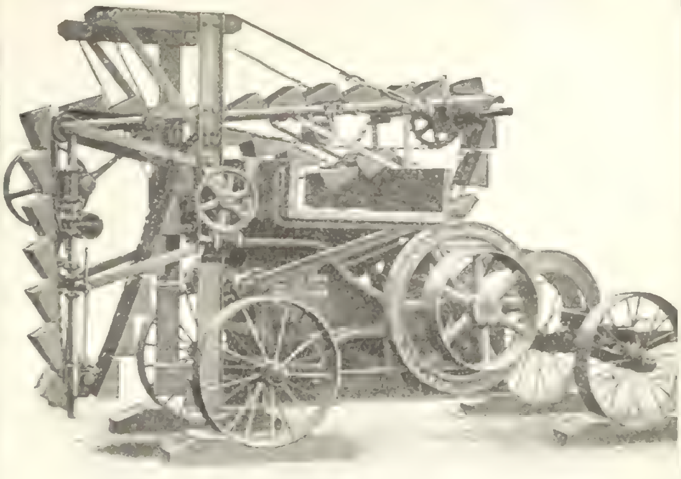
IMPROVED EQUIPMENT COMPANY

Executive and Sales Offices: 60 Wall St., NEW YORK

COMBUSTION ENGINEERS

Gas Benches
Complete Gas Plants
Complete Lime Burning Plants

Gas Producers
Retractory Materials
Special Industrial Furnaces



Steel Castings and No Lost Motion

forged steel yoke, cross bars on yoke remove all strains from main frame, moving jaw given a compound oscillating and reciprocating motion so that crushing is **continuous**, are features of the

Aurora Steel Rock Crusher

Its compact form combines great strength with light weight, making it very portable, and **specially adapted for contractors' use.** Strongest and most durable crusher on the market combining maximum product with minimum power. Adjustable to various sized stone. *Get our Special Crusher Catalog*

WESTERN WHEELED SCRAPER CO.

Earth and Stone Handling Machinery. **Aurora, Ill.**

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or 5¾c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.

Hagersville, Ont.

Limited

CLASSIFIED INDEX TO ADVERTISEMENTS—Continued

Rubber Belting
  Goodyear Tire & Rubber Co.

Safes and Vaults
  Taylor, J. & J.

Sand and Gravel
  Sand and Supplies Ltd
  York Sand and Gravel Co.

Screens
  Greening Wire Mfg. Co., B.
  [illegible] & Chapman Co.

Sewer Pipe
  Britnell & Co.
  Canada Iron Corporation
  Dominion Sewer Pipe Co.
  Gartshore Thomson Pipe Co.
  [illegible] Clay Products
    [illegible]
  National Iron Works
  Ontario Sewer Pipe Co.
  Ontario Lime Association
  Smyth & Ryan
  Standard Drain Pipe Co.

Sewer Trenching
  Austin Drainage Excavator Co.
  Mun. Engineering & Contracting
    Company

Sound Deadening
  Cabot Inc., Samuel

Shovels (Steam)
  Browning Engineering Co.
  Beatty & Sons, M.
  Canada Foundry Co.
  Hopkins & Co., F. H
  Montreal Locomotives Works
  Mussens Limited
  Willis Shaw Mach. Co.

Shovels
  Lundy Shovel & Tool Co.

Smoke Stacks
  Des Moines Bridge Co.

Stains, Shingle, Cement & Bricks
  Cabot, Inc., Samuel

Steam Apparatus
  Sturtevant Co., B. F.

Steam Turbines
  McDougall Caledonian Iron Wks

Steel
  Canada Steel Co., Ltd.

Steel Bars
  Canada Steel Co., Ltd.
  Factory Products
  Steel Co. of Canada
  Steel & Radiation, Ltd.

Steel Shingles and Ceilings
  Galt Art Metal Co.

Stone
  Britnell & Co.
  Brodie, Jas.
  Canadian Norcross Bros.
  Christie, Henderson & Co.
  Consolidated Stone Co.
  Contractors' Supply Co.
  Corinthian Stone Co.
  Crushed Stone, Limited
  Hagerville Contracting Co.
  Mahan & Company
  McMillan & Son, W.
  Morrison & Co., T. A.
  Myers, Oakley
  Queenstown Quarry Co.
  Rogers Supply Co.
  Roman Stone Co.
  Sackville Freestone Co.
  Sand & Supplies
  Smyth & Ryan

Stone Saws
  Anderson, Geo.

Structural Iron and Steel
  Canada Steel Co.
  Des Moines Bridge Co.
  Dominion Bridge Co.
  Factory Products
  Hamilton Bridge Works Co.
  Mackinnon Holmes & Co.
  McNeil & Co., W. P.
  Phoenix Bridge & Iron Works
  Reid & Brown
  Sarnia Bridge Co.
  Steel Co. of Canada
  Structural Steel Co.

Submarine Drills
  Canadian Rand Co.

Tanks and Stand Pipes
  Berg Machinery Co.
  Des Moines Bridge Co.
  Inglis, John
  Jenckes Machine Co.
  Marsh & Henthorn
  McDougall Caledonian Iron Wks
  Ontario Wind Eng. & Pump Co.
  Piggott & Co., Thos.

Tents
  Turner & Sons, J. J.
  Woods Limited

Testing and Inspection Bureau
  Hunt & Co., Robt. W.

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  Canada Iron Corporation
  Gartshore-Thomson Pipe Co.
  Kerr Engine Co.

Varnishes—Insulating
  Standard Underground Cable Co
    of Canada Limited.

Ventilating & Heating Apparatus
  Sturtevant Co., B. F.

Veterinary Remedies
  Johnson, A. H.

Waterproofing
  Cabot, Inc., Samuel
  Can. H. W. Johns-Mansville Co.
  Ceresit Waterproofing Co.
  Chillas-Black
  Elaterite Paint Co.
  Ontario Lime Association

Water Softeners and Filters
  American Water Softener

Water Turbines
  Canadian Boving Co.
  Escher Wyss & Co.
  McDougall Caledonian Iron Wks

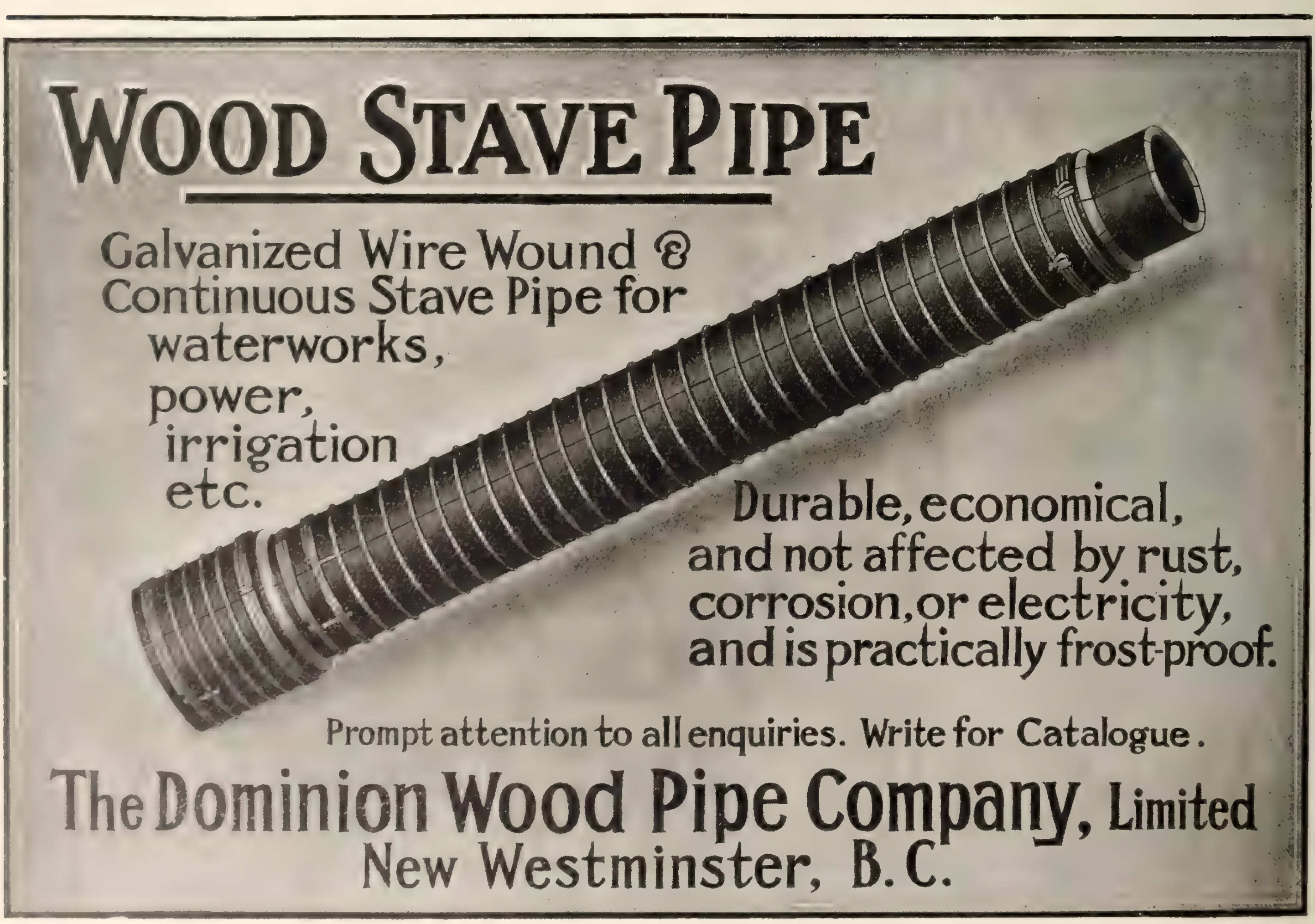
Water Wheels
  Canadian Boving Co.
  McDougall Caledonian Iron Wks

Wire
  Canada Wire & Cable Co.
  Factory Products
  Standard Underground Cable Co
    of Canada Limited.

Wire Guards and Screens
  Canada Wire & Iron Goods Co.
  Crescent Wire Iron Works
  Greening Wire Co., B.

Wire Rope
  Canada Wire & Cable Co.
  Greening Wire Co., B.
  Smith, Thos. & Wm.
  Steel Co. of Canada

Wood Turnings
  Automatic Wood Box & Turning
    Company



WOOD STAVE PIPE

Galvanized Wire Wound & Continuous Stave Pipe for
waterworks,
power,
irrigation
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Preserves Roads
Prevents Dust~

Tarvia Modern Pavement in Mount Pleasant Cemetery, Toronto

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In 1909, Mount Pleasant Cemetery, Toronto, built some beautiful roads with "Tarvia X," according to our Modern Pavement Specification. Cemetery roads get hard use from the heavy loads incident to the transportation of monuments, and ordinary macadam fails under such crushing strains. The tarviated macadam, being slightly plastic, is improved by such rolling.

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>
> Dear Sirs :
>
> I wish to let you know we will require "Tarvia X" to build about 6,000 yards of road this year about the end of July.
>
> I may say that we are well pleased with our Tarvia roads. The first that were made in 1909 have stood the test of traffic and heavy loads up to 6 tons the wagon wheels leaving no impression.
>
> Where our roads have a 7% grade we find the Tarvia fills the bill, no washing, no dust, easy to sweep and clean in wet weather.
>
> (Signed) W. H. FOORD, Supt.

Tarvia is made in three grades :

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"Tarvia A" for hot surface application.

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REASONABLE PRICES

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The Marble for this Building cut at our Toronto Plant

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"CEMENT FILLER" and "CEMENT FLOOR PAINT"

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Established 1848

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For application to the inner surface of exterior brick or masonry walls, above grade level. Prevents the penetration of dampness. Saves the cost of furring and lathing.

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For backing limestone, granite and other building stones. Absolutely prevents any interior acid, alkali, rust or moisture from reaching the surface of the stone.

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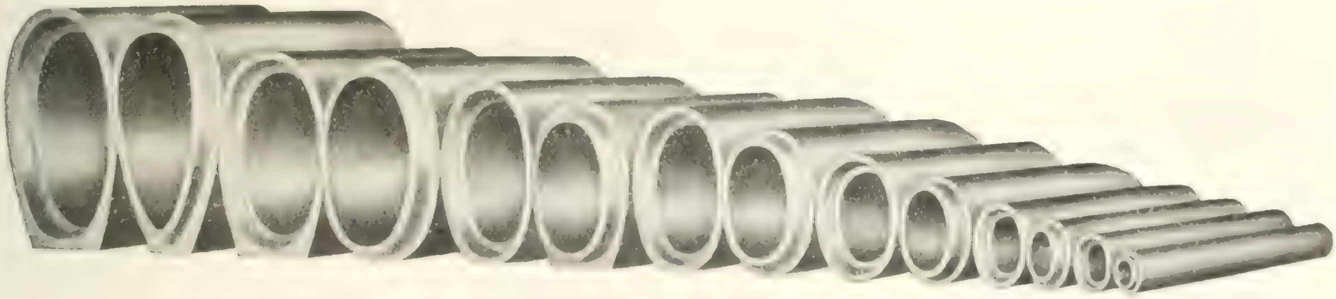

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properly built of properly made

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LAST FOREVER.

OUR MATERIAL, SYSTEM and PRODUCT have been tested and approved by EMINENT ENGINEERS. NO RUST, NO ROT, NO FROST-BREAKS, NO PRESSURE-BREAKS, NO HIGH PRICES, NO DELAYS IN PROCURING, NO TROUBLE IN HANDLING.

STANDARD REINFORCEMENT, or SPECIAL if required. Stock sizes 6 in. to 60 in.

Patronize Experienced and Reputable Manufacturers.

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SWANSEA

Salt Glazed and Vitrified

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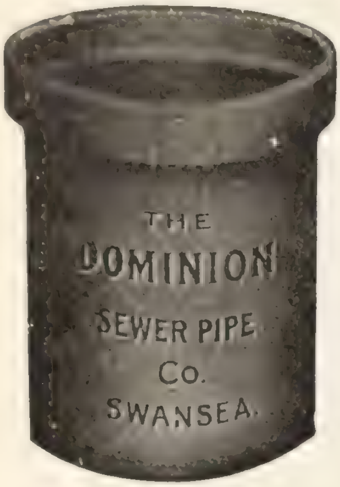

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SWANSEA (near Toronto)

The

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Two Factories:

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For the Past Several Years

We have been building up a reputation for "MIMICO" SEWER PIPE by giving our customers good pipe when they order them and keeping what seconds we have for those who want cheap pipe. It is more expensive than sending out the bad with the good in the hope that a rough one here and there will be overlooked, but we have stuck to it and

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That is why we are obliged to ask more for our pipe than other makes bring and that is why we are getting it.

That you will get

Full Value for Your Money

is our aim, and if it costs a little more for the right goods and prompt service, Mr. Contractor, we ask you fairly, is it not worth it?

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An Inexpensive Mixer for Sidewalks or House Foundations

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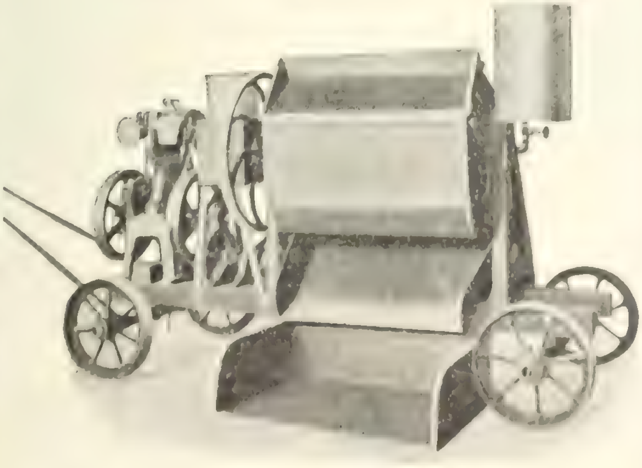

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Mr. Contractor—Don't take our word for it, that we have the best **Concrete Mixer** on the market, but ask any contractor who has used, or is using the

Chain Belt Mixer

just what he thinks of it.

IN MILWAUKEE there were about twenty concrete mixers sold in 1911 and fourteen were **Chain Belts**. Six of the leading concrete mixer companies have their plants in Milwaukee. Draw your own conclusions, Mr. Contractor.

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For Limestone, Marble and Sandstone

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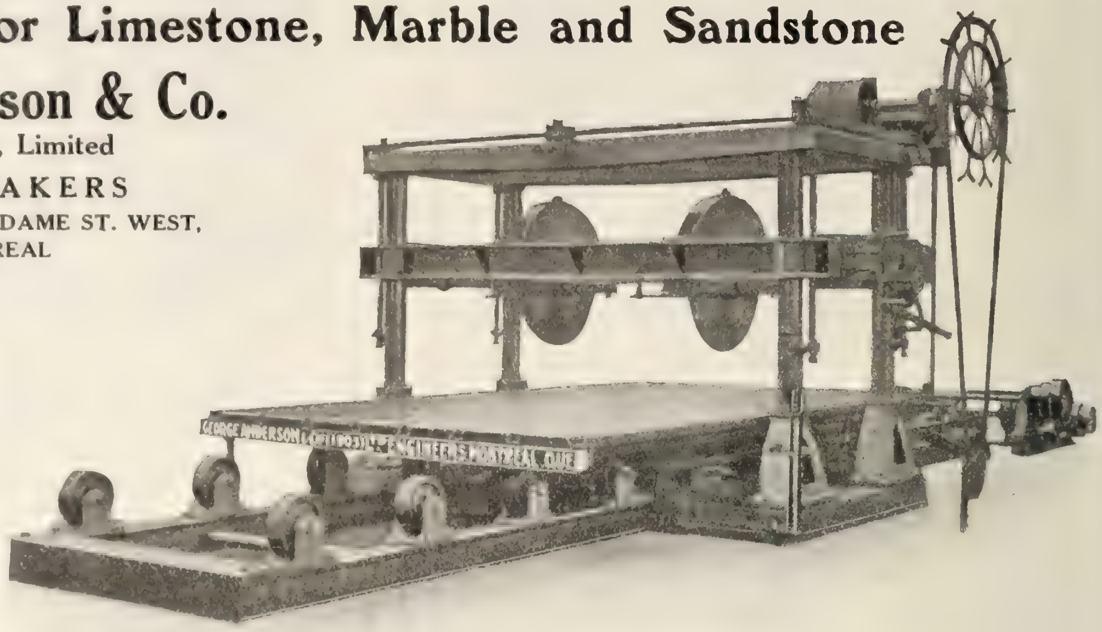

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About 50 of the above Machines at work in Canada

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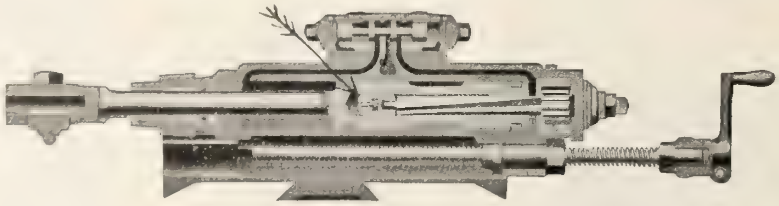
Don't allow traditions, and a stock of spare parts of obselete drills to keep you from using progressive methods and up to the minute tools.

The McKiernan-Terry "Wizard" rock Drill is the last word in a piston rock drilling machine.

It has an air cushioning device on the end of the rifle bar.



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Withstands 250 lb. working pressure.

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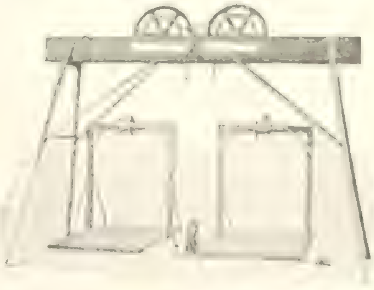

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Corinthian Stone is unequalled for Strength, Appearance and Color.
Especially adapted for Bank and Office Buildings.

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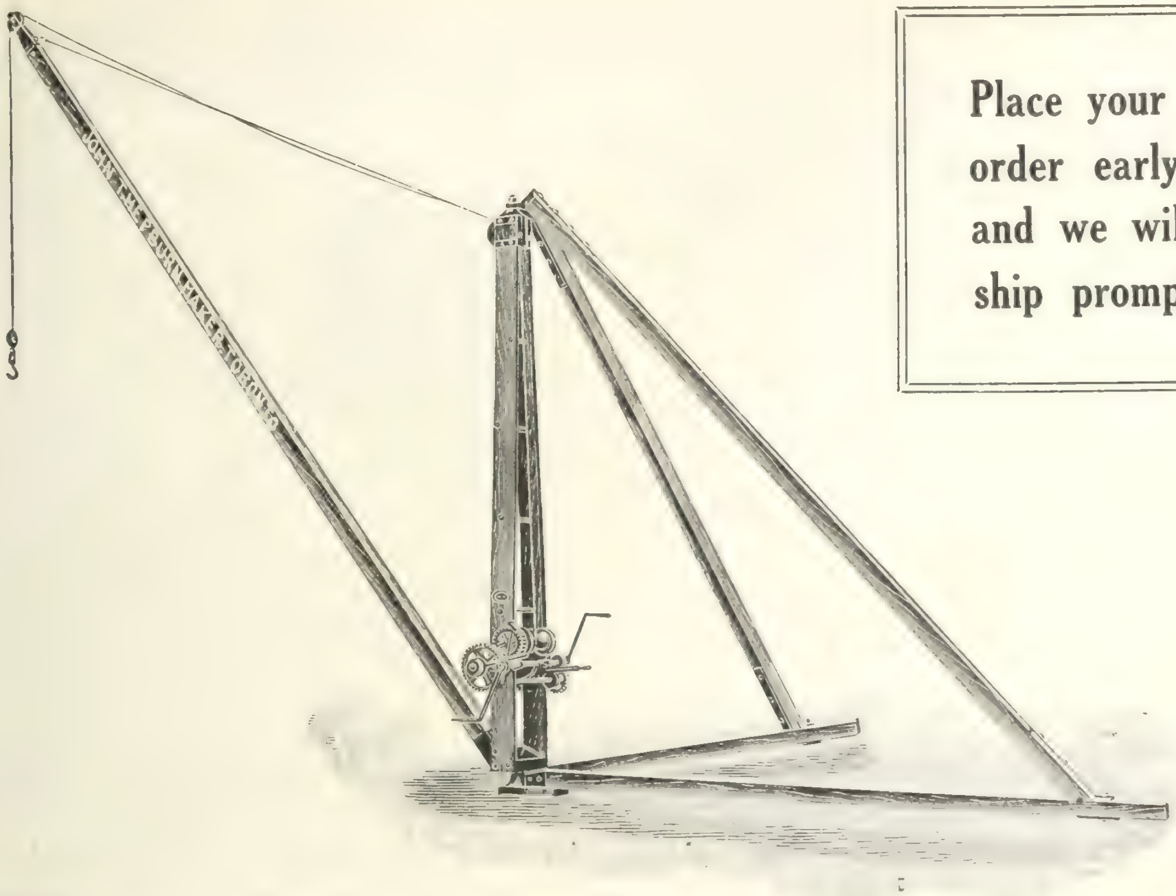
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If you cut the time upon a job and still do the job right, you are time and money in pocket. When you reduce labor by better methods and better equipment you also save time—and save money. You can get through more work, in less time, and at a better profit.

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They have weight where weight is needed. They have great strength. Yet every part is so well proportioned, so accurately and staunchly built, that a Hepburn Derrick is more easily operated and will do more work than any other derrick on the market.

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Steel Curb and Gutter Forms

Lineal Feet Built, 9,983.
Time 200 Hours.
Labor Force, 16 Men.
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LABOR COST, 8.3 Cts. Per LINEAL FT.

Users of Wooden or any other Forms, Match it if you can!

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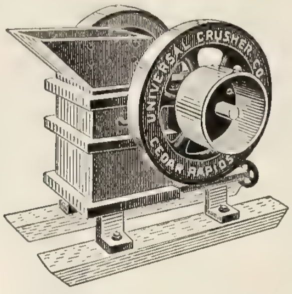
THE "FORCE FEED" CRUSHER



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Instantly adjustable to crush to any desired size from 2½ in. down to sand in one operation. Makes a uniform product in every size. Gives maximum capacity, using half the power. Recognized as standard. It will save you money.

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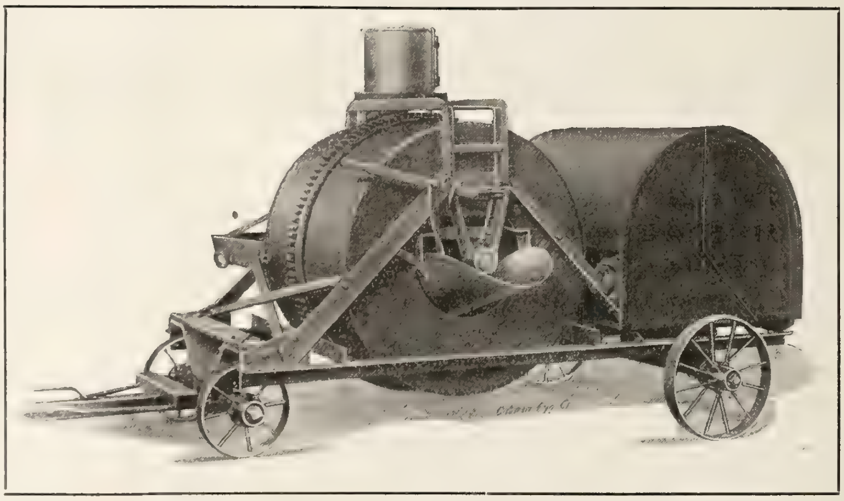

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Rock Crushing Plants
of any desired capacity

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A complete line of quarrying machines and Supplies

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Excavating Machinery

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"Made in Canada"

Let us send you our Catalog M—fully describing the CHAMPION MIXER. If you are interested in Concrete Mixers, it will pay you to investigate the CHAMPION. It's a machine you should know.

Motor Driven Street Sprinklers and Flushers. 'The height of perfection in this class of machines.'

Manufactured by
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Exclusive Representatives
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We make a specialty of complete Rock Reducing Plants. We supply everything needed including power.

EFFICIENCY

In Water Meters

Means Just This:

Accuracy, uninterrupted service, without frequent and expensive repairs and the application of the right principles of construction and operation to specific needs.

Let us tell you something of the efficiency of our Water Meters and the various types which we manufacture

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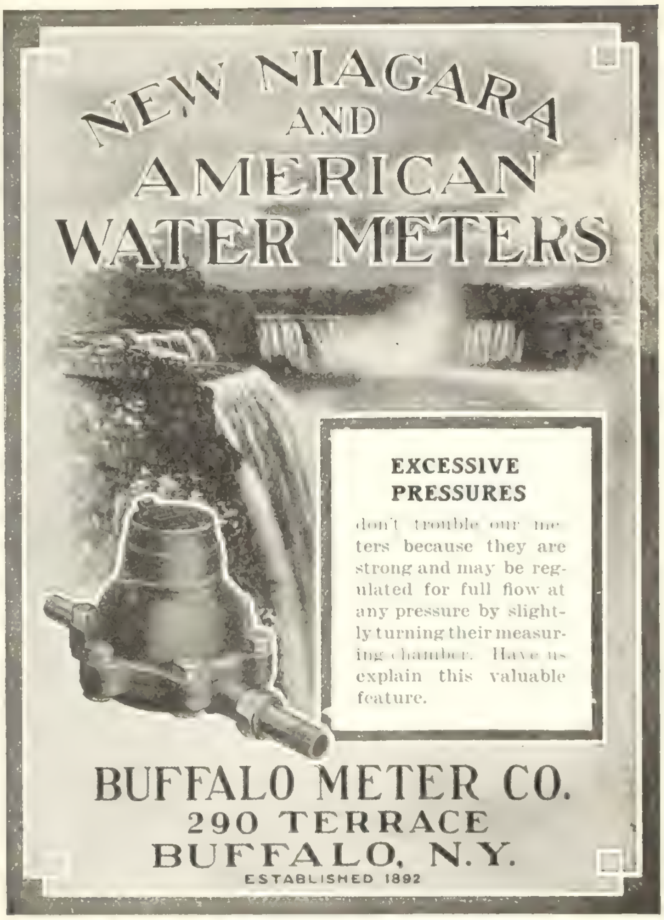
Worcester, Mass.



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AND
AMERICAN
WATER METERS

EXCESSIVE PRESSURES

don't trouble our meters because they are strong and may be regulated for full flow at any pressure by slightly turning their measuring chamber. Have us explain this valuable feature.

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290 TERRACE
BUFFALO, N.Y.
ESTABLISHED 1892

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for Engineers and Contractors

We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

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Water
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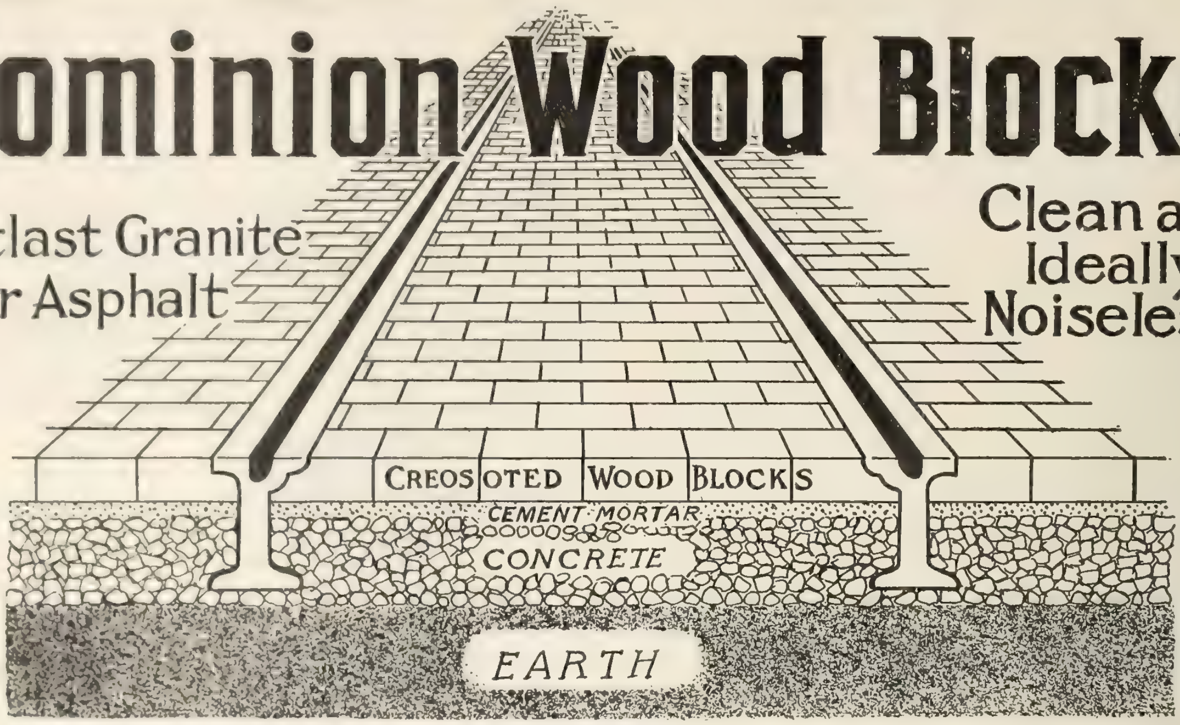

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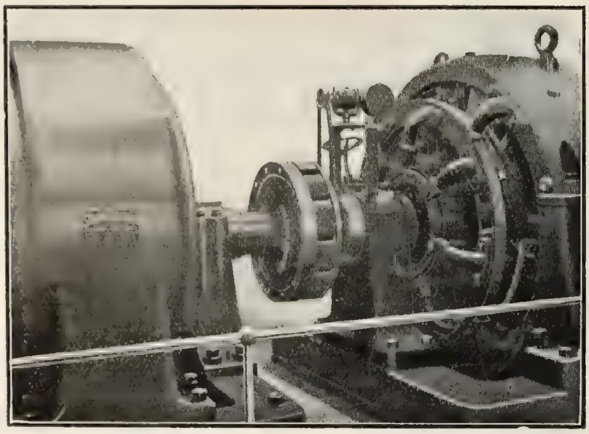

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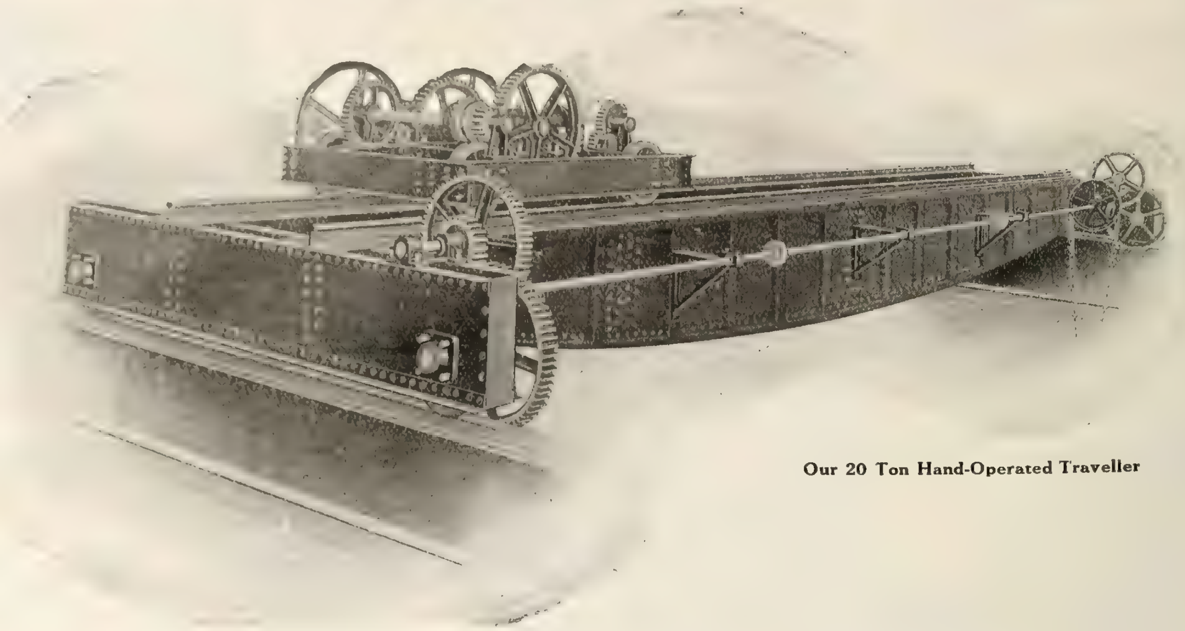

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The Koehring 3 in 1 principle of mixing means three times as much mixing or an equal amount of mixing in one-third of the time. There are three independent and opposed mixing actions in the Koehring drum producing thoroughness of mixing and rapidity of mixing and a uniformity of mixing, no other Mixer equals. There are also equally important advantages in the mechanical construction of the Koehring Mixer.

The heavy cast special metal Koehring drum will outlast the drum of any other Mixer. The railroad truck bearing truss and the rollers being keyed on to the axle, makes "wabbly" drums impossible.

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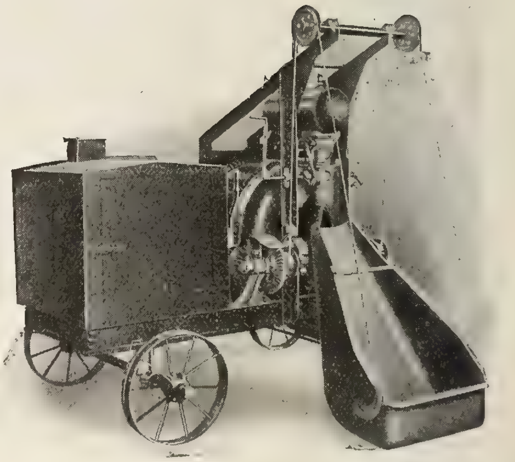
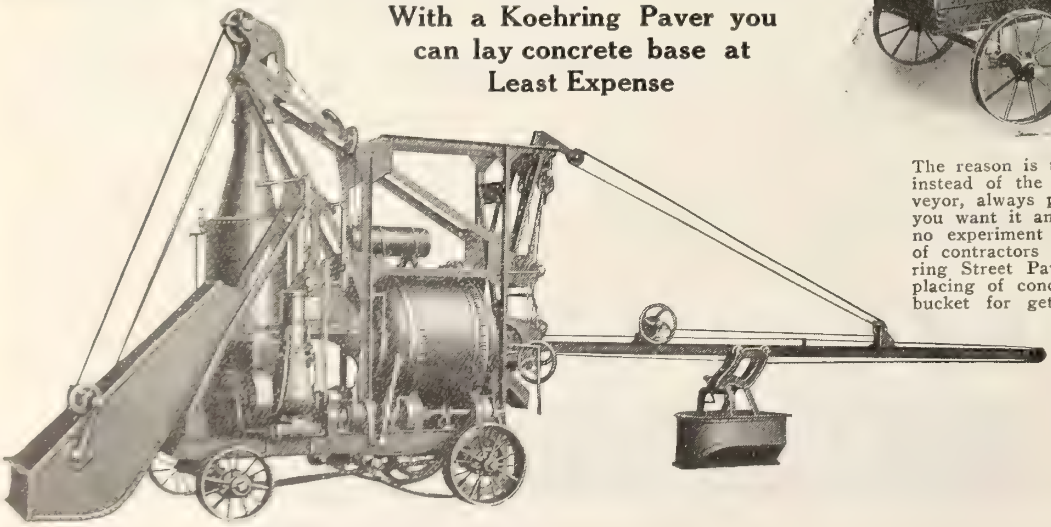


With a Koehring Paver you can lay concrete base at Least Expense



The reason is the machine conveys the concrete instead of the men, and it's a dependable conveyor, always places the concrete exactly where you want it and always dumps clean. There is no experiment about it, the records of dozens of contractors prove the economy of the Koehring Street Paving Mixer and it combines this placing of concrete with a simple charging bucket for getting material into the drum in shortest possible time and least number of men, also, it has traction drive for moving the machine along the line of work and keeping close to the material pile. This builds contractors reputations and pays handsome profits. Aren't you interested in this reputation and profit making

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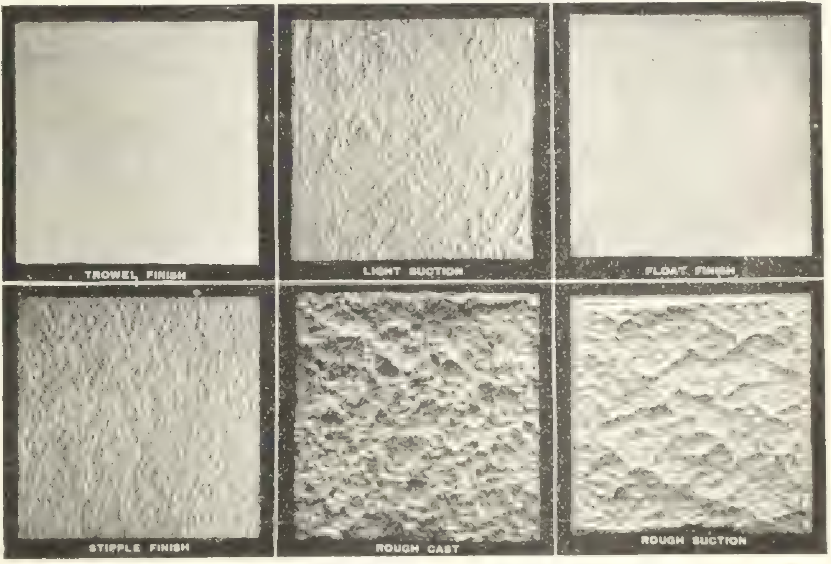

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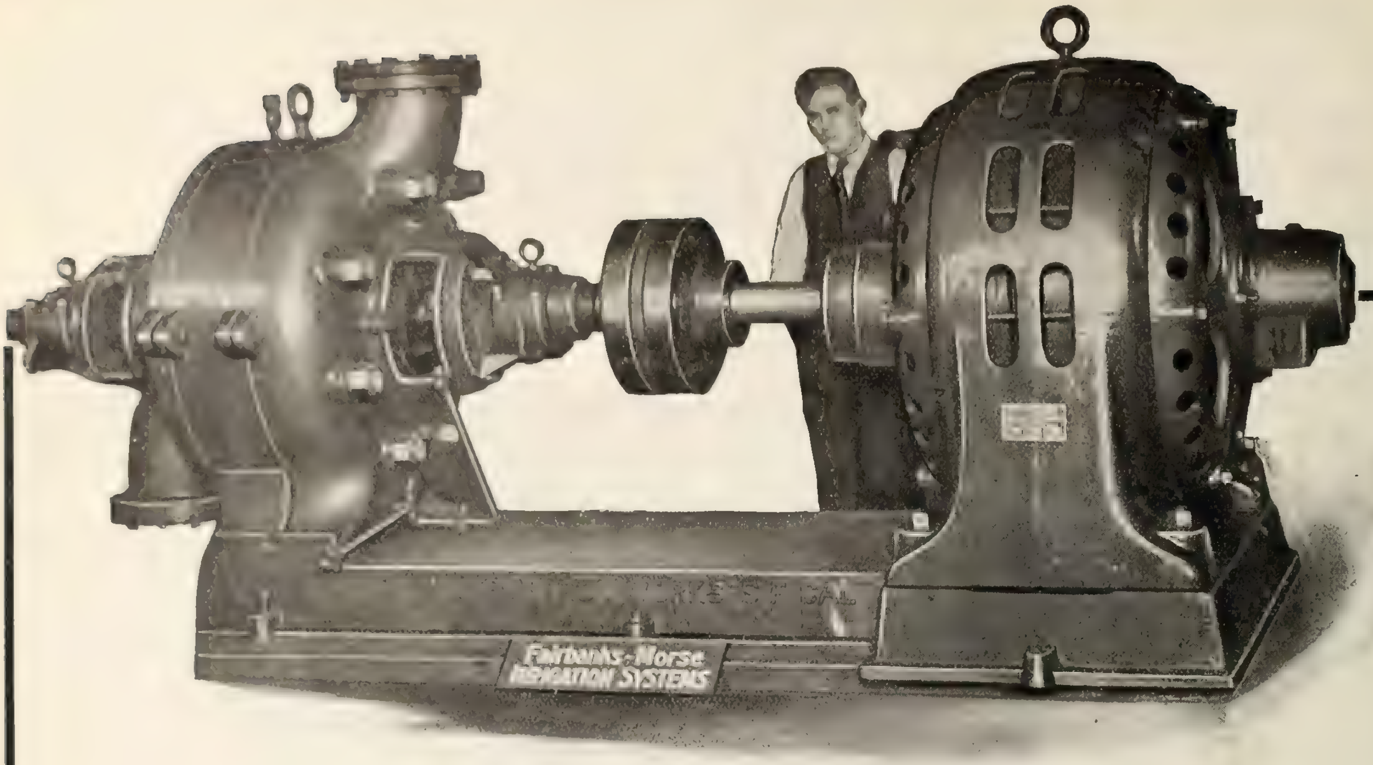
File your plans for any work you are inviting bids on, in our offices at Toronto, Montreal, Winnipeg or Vancouver.

Contract Record
Toronto Ontario



The Largest Direct Connected Centrifugal Pumping Unit in British Columbia

The Vancouver Power Company have recently installed at their works at Coquitlam Dam, B.C., the largest direct connected centrifugal pumping unit in British Columbia. This outfit is to operate in parallel with a number of other pumps that are to furnish water under pressure for sluicing into place the material for their new dam.

This pump is a 10-inch, class "F," two-stage centrifugal, with bronze impellers and renewable bronze diffusion vanes. It has a normal capacity of 1833 Imperial gallons per minute when operating at 1160 r.p.m. against a total head of 355 feet or an equivalent pressure of 154 lbs. per square inch. It is mounted on a common sub-base with a 300 H.P. type "B," Fairbanks-Morse squirrel cage, induction motor, 2200 volts, 60-cycle, 3-phase, 1160 r.p.m. at full load being direct connected thereto by means of a flexible leather link coupling.

The motor possesses a feature in rotor construction that is unique. The end rings are welded on to the rotor bars by a new process, making a perfect joint, free from the troubles common to the purely mechanical or riveted joint, such as oxidation, working loose, and solder-throwing. This improvement marks a long step forward in the elimination of rotor trouble.

Our Vancouver Branch supplied and assembled this complete pumping unit. We are in a position to quote on the necessary equipment for any pumping requirements upon receipt of specifications.

The Canadian Fairbanks-Morse Co.

Limited

Fairbanks Standard Scales—Fairbanks-Morse Gas Engines, Pumps, Safes and Vaults

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Power-Saving Rubber Belting

Goodyear Rubber Belting stands for power saved and money saved. It is built up of plies of rubberized fabric cured and vulcanized into one solid piece. It neither slips nor stretches. It has the cohesiveness of rubber with the enormous tensile strength of close woven, long fibre cotton fabric from which *all stretch has been taken out.*

Goodyear Rubber Belting is manufactured by a process that makes it proof against steam, water, weather and rot. Made in all three grades and all sizes. For Pulp, Paper, Saw Mills—*all* mills where horse power transmitted is large and demand for tensile strength great. Used by biggest lumber mills and manufacturing plants in the Dominion. ***Outlives, outlasts,*** all other belts.

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Goodyear Underwriters is a hose built to meet the specifications of the Associated Factory Mutual Fire Insurance Companies. Tube used of highest grade NEW rubber. ***Won't*** harden or crack with age. Special circular woven fabric with least expansion or elongation under pressure. Antiseptically-treated to make it rot and mildew proof.

The strongest, most reliable hose for all mills and factories. Insist on ***Goodyear Underwriters, the hose with the black and yellow stripes.***

Non-Chipping Conveyor Belts

Built for all purposes. For conveying crushed stone, grain, coal, ore, etc.

Made in all thicknesses of face to suit requirements of buyer. Rubber face made of toughest stock possible, to prevent cutting and chipping. Gives longest, most enduring service.

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" Our sales of the last four months 50 per cent. greater than those of last year. Defective goods returned only $23.93."

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General Offices—Toronto **Factory—Bowmanville, Ont.**

Write Our Nearest Branch

BRANCHES: Montreal—Winnipeg—St. John, N.B.—Vancouver—Calgary

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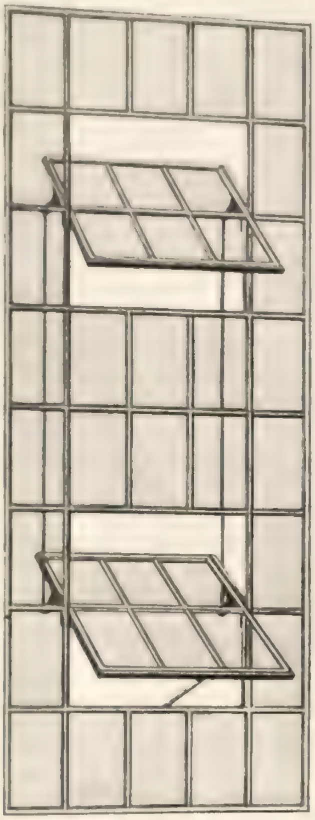

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THE ORMSBY-LUPTON "UNDERWRITERS" STEEL SASH for side walls, means a Sash every detail of which is characterized by strength and simplicity. "Tested the Way The Wind Blows," the joint is wonderfully strong. The straight line joint and the refinement of the detail will please you.

Further, the distance between muntins is accurately maintained so that you can use standard glass without cutting at the building.

Send for Catalog and Sample. You will be convinced that it is a practical sash at a price you can afford to pay.

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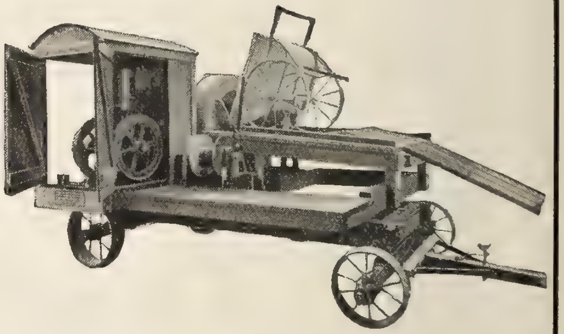
REPRESENTATIVES:—General Contractors' Supply Co., Ltd., Halifax; Stinson-Reeb Builders' Supply Co., Ltd, Montreal; Canadian Agency & Supply Co., Ltd., Ottawa; C. H. Abbott Agency & Supply Co., Regina; Robt. Sclanders, Saskatoon; C. H. Webster, Calgary; Walker & Barnes, Edmonton; Evans, Coleman & Evans, Vancouver and Victoria.

We also manufacture Fireproof Tin Clad, Kalemeined Clad and Rolling Steel Doors, Skylights, Cornices, Fire Extinguishers, Fire Bucket Tanks, Slate, Felt and Gravel Roofers.

"The Standard" Low Charging Concrete Mixer with "Cart Charger"



"The Standard" "Cart Charger" is designed to use the power on the mixer to bring loaded carts from the material piles to the mixer platform.

A simple hoist with cable for attaching to carts is used.

By using a number of carts, several batches can be filled at the material piles, should there be any delay at the mixer for any reason.

The "cart charger" will save several men in operation, and more rapid work will be accomplished. The saving in labor will quickly pay the entire cost of the outfit.

"The Standard" new catalogue No. 45 gives more information about the "cart charger" as well as other special and regular designs which will save hundreds of contractors thousands of dollars before the year 1912 is over. Will you be one of them? Your name brings a catalogue. Write for it today.

The Standard Scale and Supply Co.

1345-1347 Wabash Ave., CHICAGO.
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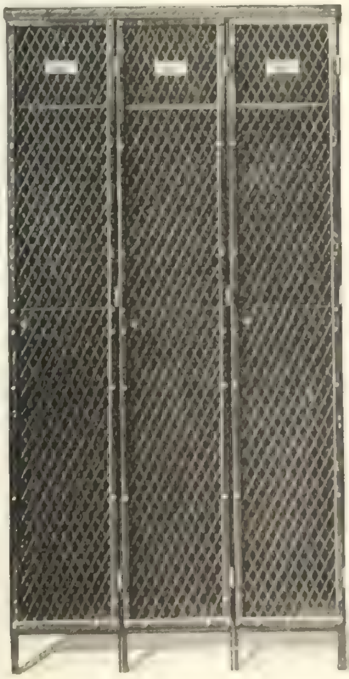

from the old style wooden lockers and use **Meadows' Metal Lockers.** Their construction is rigid and embodies a number of original features not found in other makes worthy of your consideration.

Send for our interesting booklet entitled

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Toronto Wire, Iron and Brass Works Co., Limited
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That Fit Snugly

Every city and town requiring street openings should see that only the best manholes are used.

We make a specially reinforced manhole cover that fits snugly and is unusually strong.

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The complete reorganization of our business enables us to give better service than ever before.

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ESTABLISHED 1886

Contract Record and Engineering Review

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Vol. 26 June 12, 1912 No. 24

The "Blatant Enormities" of Street Advertising

According to a London contemporary the conscience of the British public is awakening to the demand for the preservation of their streets from the "blatant enormities of the advertiser." The ingenuity exercised upon this continent in the matter of illuminating and moving street advertising is criticized as being "the extreme of human endurance." In London, the first definite check to the progress of street advertising has been administered by the London County Council, which has refused to permit such advertising on one of the large city bridges. The public conscience in Canada is not bothering itself about this question so far, but none the less the matter seems to be one into which civic authority should enter more than it does.

Third International Road Congress

We have received from Mr. W. Rees Jeffreys, London, Eng., Honorary Secretary of the Permanent International Association of Road Congresses, an advance programme of the events arranged for the 3rd International Road Congress, which is to be held at London in 1913, from June 23-28. These Congresses are now being held triennially. The first was held in Paris in 1908 and the second in Brussels in 1910. Their object is to collect and circulate all the latest practical and scientific knowledge bearing upon the construction and maintenance of highways. The Congress of 1913 is taking place on the invitation of the British Government and under the patronage of His Majesty the King. Having regard to the rapid development of road construction in Canada and in view of the numerous opportunities for the inspection of work in England, it is hoped that the number of Canadian delegates will be large. Papers and reports will be submitted by the leading authorities throughout the world and an exhibition of road machinery and materials is being organized in connection with the Congress. Excursions have been planned to various places of interest, including one to Windsor Castle at His Majesty's invitation. The Honorary Secretary, Mr. W. Rees Jeffreys, is now touring the United States and Canada with the object of stimulating interest in the Congress on this side. He is due in Toronto on June 27, and will afterwards visit Ottawa, Montreal and Quebec.

Is the General Quality of Construction Adversely Affected by the Principle of the Lowest Bid?

METHODS of inviting and awarding tenders have been a fruitful source of discussion in this country in recent years, particularly among readers of the Contract Record and Engineering Review. Some time ago a reader of this journal came forward with the suggestion that tenders should be awarded not to the lowest bidder but to the lowest but one. The suggestion fared badly in the discussion that ensued, but the defeat of would-be reformers does not appear to bring about any greater satisfaction with the cast-iron principle—when it is such—of awarding the contract to the lowest bidder. There would appear to be every reason for such awards, provided the contractors submitting the lowest bids could furnish proof of their financial standing and their ability to carry out the work. But however satisfactory these things may seem when the lowest bid is under consideration, and however well equipped, financially and otherwise, the lowest bidder may be, it is the same old story when the work is half way through, if it is being carried out on a losing basis. The only conditions under which satisfaction is obtained on contract work is where the contractor is carrying out the work honestly and making a fair profit.

There is no doubt that there is an increasing tendency to get work done as cheaply as possible—to obtain low figures, irrespective of whether the contractor makes a profit or not. Such reflections incline one to think that this popular but in many ways undesirable practice of accepting the lowest bid should not be encouraged as a hard-and-fast rule among municipalities. And yet we suppose that if sufficient leeway were given those same authorities to override the lowest tender it would not be very long before nine contracts out of ten became a matter of graft.

In all such cases as these one eventually finds oneself between the devil and the deep sea. But in some instances the principle of accepting the lowest tender seems particularly undesirable. Applied to reinforced concrete work, for example, it leads to unjustifiably hopeful estimates of loads, bending moments, stresses, and the capacity of reinforcement for the resistance of stresses. That this is not an incorrect view is proved by many cases where the accepted tender has provided for far less steel--sometimes even fifty per cent. less--than the next tender. Such differences simply mean reduced factors of safety and construction involving serious risk of collapse.

And this leads us to an important aspect of the question, namely, whether the general quality of construction is adversely affected by a practice which encourages contractors to [illegible] in submitting the lowest figures. If it is, the contracting community will lose balance and repute—and in no business is reputation a more valuable asset than in this one.

The question set forth in the heading under which this article is written cannot fail to be of interest to those concerned with the award of contracts, and a discussion of the subject by contractors themselves will perhaps help to mould ideas which may come to fruition at a later date. We could cite instances where the award of important contracts to the lowest bidder in face of the weightiest advantages attached to a slightly higher figure, has been attended by loss and even disaster. Doubtless the testimony of our readers will be illuminating in this particular.

PROGRESS ON THE QUEBEC BRIDGE CONSTRUCTION

Special to the Contract Record and Engineering Review

THE substructure of the Quebec Bridge consists in all of seven piers; two main or river piers, built with the aid of pneumatic caissons; two anchor piers, two abutments, and an intermediate pier between the north abutment and the north anchor pier. The north anchor pier having its foundation below high water requires a cofferdam, while the remaining ones are well above the water line and can be built dry on the solid rock.

The piers will be of uniform appearance, being constructed of granite masonry with concrete backing. The abutments remain practically as built for the old bridge, the only alteration being a slight change in the coping and in raising the retaining wall to conform to the new elevation of the base of rail. The main and anchor piers are being built entirely new, using some of the granite from the old piers which have been taken down. The location is slightly different from that of the old ones, but the centre line of the bridge remains unchanged.

During the present season the work on all the piers will be carried on simultaneously, but it is not expected that the substructure will be completed until the season of 1913. One of the chief difficulties with which the contractor has to contend is the short working season. Work is practically impossible from December 1st until March 1st—not only on account of the severe cold and deep snow, but also owing to the heavy ice in the river and along the batture, which destroys all falsework and stagings below high water line.

The Close of the Season of 1911

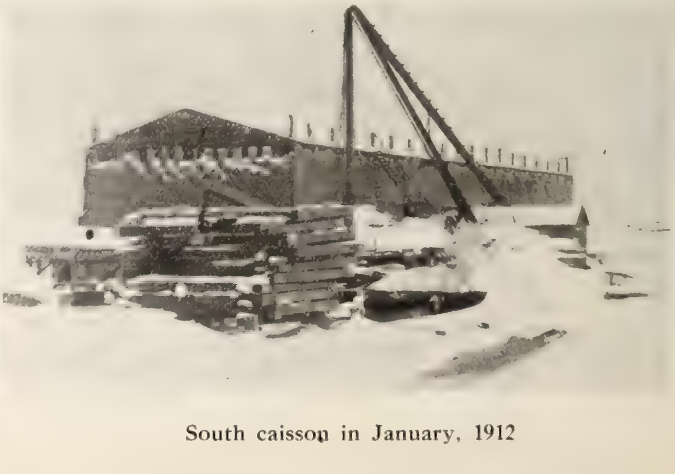
The two pneumatic caissons which form the foundation of the north main pier were described in the "Contract Record" of July 5, 1911. These caissons were sunk to elevation 20.0, about 81 feet below high water, and the chambers were sealed on October 29, 1911. Owing to the lateness of the season it was impossible to reach solid rock. The soil at this elevation is a glacial drift of sand, gravel and large boulders, which after being tested was found to make a satisfactory and safe foundation for the maximum load which will be placed upon it. The Chief Engineer decided that it would be safer to stop sinking and seal the caissons at this depth than to hold them during the winter and attempt to reach rock the following spring, exposing them to the danger of damage from the ice.

The laying of granite masonry was begun immediately after sealing the caissons, but had to be stopped on November 18 on account of the early arrival of cold weather after two courses had been placed.

From October 28th until November 25th the contractor was busy preparing the plant for the winter. The derricks and working platform on the south or river side of the caisson were taken down to escape damage from the ice, and both caissons were protected on this side by rip-rap. Large blocks of stone, about one cubic yard each, were used, running them out on lorries on a track built on top of the caissons along the south edge. The crib work of the caissons was also protected by weighting it down with about 100 tons of granite piled upon it on a timber grillage. The caissons were then allowed to fill with water and freeze solid. On thawing in the spring no damage was found done to them except to the caulking, which had to be removed.

During this time the entire air and steam plant

The last steamer down from Montreal, December 8, 1911



South caisson in January, 1912

View of caisson, south shore

used in sinking the north caissons was dismantled and carried on scows to the south shore. Here the compressors and boilers were placed on their concrete foundations and houses built around them. Steam coils were put in the compressor house and the work of overhauling and fitting up the machinery was carried on all the winter in order to make an early start in the spring. This was the only work at the site during the winter.

Season of 1912

On March 1st the contractor started work on his plant on the south side, the progress being greatly hindered by the snow which remained until the first of May. The caisson for the south main pier which was described in this journal in July, 1911, is 181 feet long and 55 ft. 6 in. wide. Extensive repairs have been made on it since the attempt to sink it on the north side in 1910. It has been thoroughly recaulked and an additional layer of 3-inch spruce sheeting has been placed on the outside. The deck has been reinforced by a course of 6-inch yellow pine. Ten 2-inch round rods have been run the entire length of the caisson just above the deck. These rods run through the end walls and are secured by nuts and washers and are tightened by turnbuckles. The old cribwork has been removed and re-arranged to allow an unbroken block of concrete to be laid on the deck 15 feet in depth. Eight 2-inch square rods will be placed in the concrete, 4 ft. above the deck, to prevent deformation. It is proposed to carry this caisson to solid rock a distance of about 100 feet below high water and about 84 feet below the ground level where it now rests.

View of plant, south shore

Work on cofferdam, north anchor pier, May 18, 1912

The plant used on the north shore was considered insufficient for the larger caisson and is being added to. The additions include three new water tube boilers of 125 h.p. each, manufactured by the Polson Iron Works; two double-phase compound Ingersoll-Sargent air-compressors; a No. 8 gyratory stone crusher (McCully), and a new 1½ cu. yd. Ransome concrete mixer.

The air and steam plant is one of the largest ever installed for a single caisson, and has a capacity of 1,600 boiler h.p. steam, and air compressor capacity of 13,100 cu. ft. of free air per minute. In addition to this there are several small boilers to furnish steam for the derricks and a high pressure compressor for the air drills used in the caisson.

As the caisson rests on the ground which is bare at low tide, it is possible to do some of the preliminary work without the use of compressed air. On May 21st about eighty sand hogs began to excavate under the cutting-edge, working at both low tides for two periods of about three hours each. The work is carried on from the outside and inside simultaneously, and consists in ditching and clearing beneath the cutting edge. This is done by opening up alternate sections of about six feet in length and excavating with pick and shovel, blasting the numerous boulders which are too large to be removed. When one section is cleared it is filled in with clay until the entire edge is free and ready for a drop. The caisson is supported meanwhile on timber blocking and forty sand jacks which will be used to lower it. No attempt to sink the caisson will be made until about six feet of concrete has been laid on the deck and the compressed air put on.

The work on the concrete plant has been pushed ahead since March 1st and it will be ready for operation early in June. The plant is laid out down the face of the cliff, the material being received at the top and the mixers placed at the bottom to discharge directly into cars on the lower level. Gravity has been used to handle all the materials, coal, sand, cement and stone. The operation and layout of this

Ice jam on centre line of bridge, April 27, 1912 plant will be described in detail in a later issue of the Contract Record and Engineering Review.

Interesting Problems on the North Side

Although the most interesting part of this season's work is in connection with the sinking of the south pier caisson, yet, with four piers to build, the work on the north side includes several interesting engineering problems.

The contractor has opened a new quarry at La Tuque and has a gang of stonecutters at work preparing the granite for the piers. A great deal of the stone from the old piers is being re-cut for the new ones.

The intermediate pier is to be built on a shelf cut in the solid rock with its foundation about 55 feet above high water. The excavation for this pier is nearly finished and the laying of masonry will be begun in a short time.

The foundation for the anchor pier is on solid rock at the foot of the cliff. Since it is below high water, a cofferdam is being built to keep the site dry during excavation and building. The cofferdam consists of a rock-filled crib, ten feet high and fifteen feet wide, forming the three sides of a rectangle around the pier. The fourth side is unnecessary as the surface of the rock is above high water on this face. The crib is built of 12 x 12 in. yellow pine, fastened with drift bolts. A puddle trench is dug five feet wide and five feet below the bottom stick of the crib and then the face of the crib is sheeted with 3-inch plank. A layer of heavy canvas is nailed on over the sheeting and a course of 2-inch plank is spiked over the canvas. The canvas is about 4 feet longer than the sheeting and extends out over the bottom of the trench to hold the clay. The trench is then filled with blue clay, level with the ground surface, and covered with gravel and rock for protection. The work on the cofferdam is being carried on every day at low tide, at the same time as the excavation for the pier, the spoil being used to fill the crib.

A great deal of repair work has been found necessary on the north side owing to damage done by the ice. On both the east and west platforms a large number of broken piles have been replaced. Both caissons have been thoroughly recaulked, but no stone has yet been laid on the main pier this season.

The contractors, Messrs. M. P. & J. T. Davis, are represented by their Chief Engineer, Mr. S. H. Woodard, of Noble & Woodard, and by their Superintendent, Mr. Jas. Taber. The Board of Engineers in charge of the work for the government are represented by Mr. J. D. Wilkens, Resident Engineer, and staff.

Is the Quebec Bridge Design a Failure?

Further Criticism made by Mr. C. A. P. Turner, of Minneapolis—Fundamental Points Discussed—A Proposed Cantilever Design

THE writer was much interested in the recent articles[†] by Gustav Lindenthal on the Quebec Bridge, and his exceptionally interesting design of an inverted braced arch for the structure. He is inclined, however, to believe that, if a fair comparison is made of the relative merits of the cantilever and the inverted arch, the cantilever presents for the consideration of the engineer the more desirable structure.

The writer is inclined to agree with the general conclusions of the Board of Engineers for the Canadian Government in the following particulars: (1) that the cantilever type of structure is to be preferred; and (2) that a single intersection design is to be preferred and should be more economical than a double-intersection. He disagrees with them as to the details of carrying out such a design, and agrees with Mr. Lindenthal that the design finally adopted does not compare favorably with the famous Forth Bridge.

The writer further agrees with Mr. Lndenthal in his condemnation of the conduct of the so-called competition for this work. As regards the height permissible for the structure, the specification appears to have been drawn not with an idea as to what might be economical, but rather with the idea that this particular specification would of necessity limit the structure closely or practically to the outline decided upon by the board. The height of truss adopted for the Forth Bridge at the piers was 336 ft. on centres, while the Board of Engineers arbitrarily limited their design to 290 ft., or 50 ft. shallower, for a structure carrying heavier loads. This entailed a large increase in the weight of metal without materially reducing the overturning moment.

The shore arm of the original design of the board is much longer than economy would dictate, and this lack of proper proportion gives the official design a peculiarly clumsy and ungainly appearance. But the view of one of the engineers of the board was that, the structure being so large, it could not be otherwise than ugly. The writer believes that the majority of the engineering profession would take issue with this view.

It cannot be expected that any two engineers would arrive at once at the same conclusion or opinion regarding a structure of such unusual proportions, and this is one of the reasons why the writer has taken the trouble to present herewith the outcome of some little study made by himself on a design for this structure. The design which resulted from this study is presented below, and some drawings are given. Before taking it up, however, some general remarks are offered.

The Fundamental Question of Tension and Compression Members

The failure of the original Quebec Bridge demonstrated two important propositions in bridge design:

First, that for a heavy tension member no form can be devised which will present so little uncertainty as to its degree of security and strength as a chain of well made eyebars.

Second, that in the make-up of compression members stiffness and rigidity in all directions is an essential requirement, if we expect to develop the value of the material of the section.

No one is inclined for a moment to question the absolute security and strength of the compression members of the famous Forth Bridge. Many engi-

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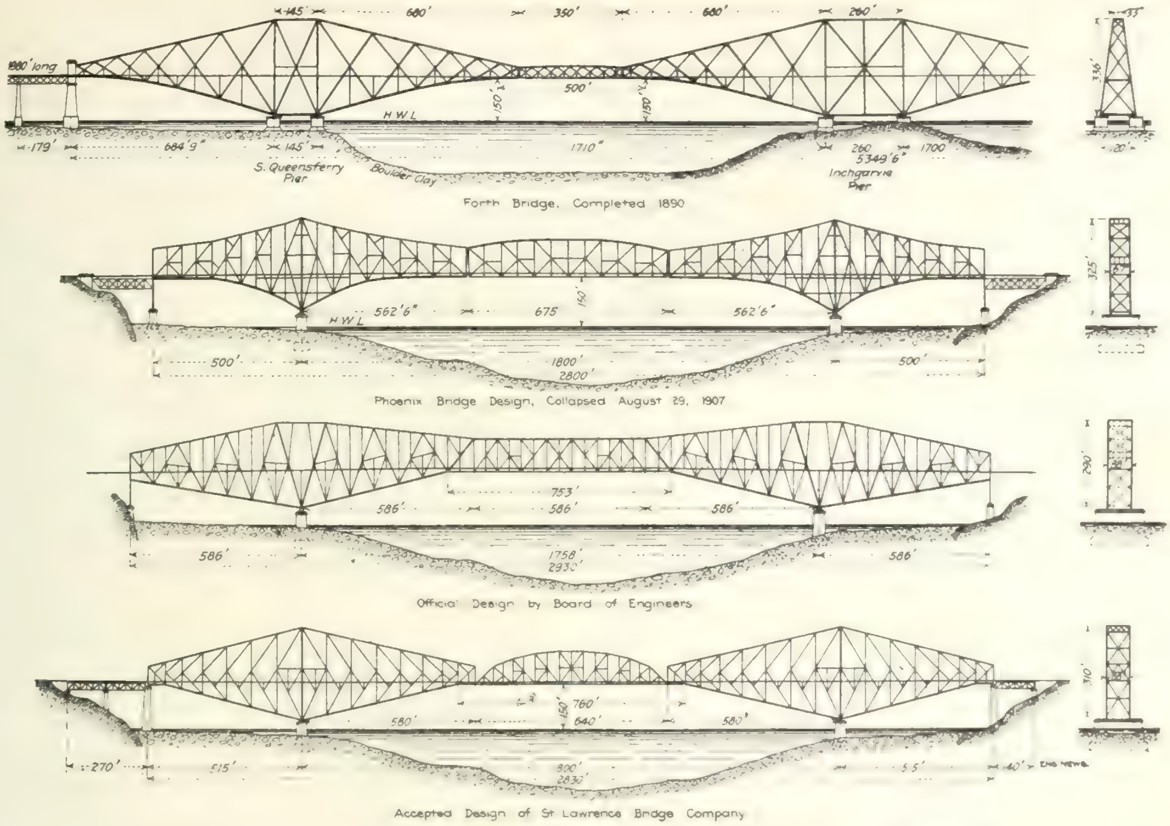
[†] Engineering News, May 30, 1912; Contract Record, November 29, 1911.



Cantilever Bridge Designs: The Forth Bridge and Three Quebec Designs

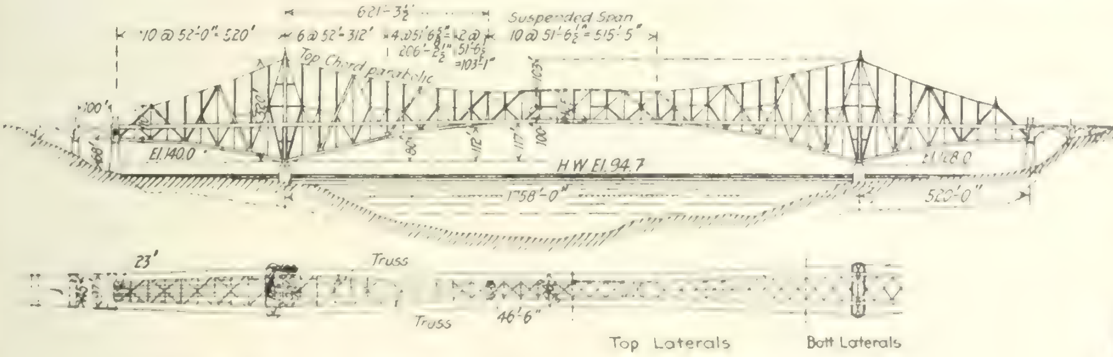
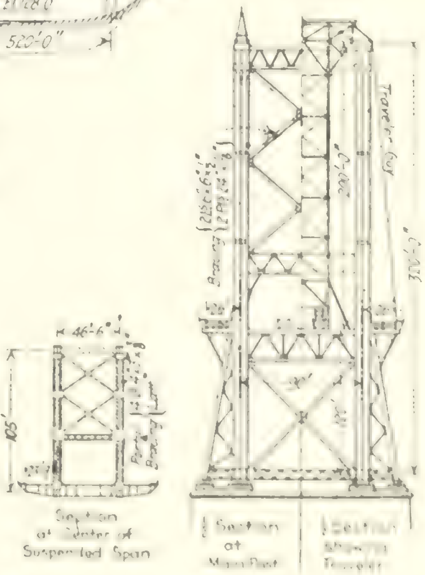


Fig 1—Outline sketch of Turner's design for Quebec Bridge



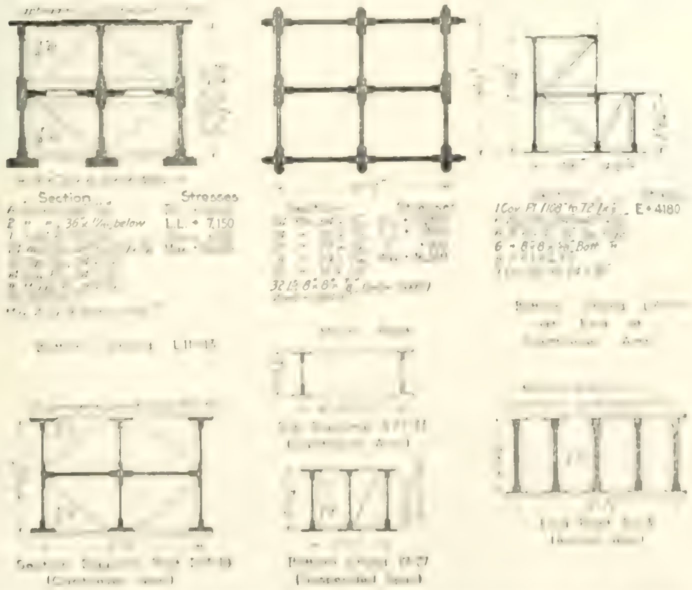


Fig 2 Sections of compression members, Turner's design for Quebec Bridge

neers, however, are inclined to question the degree of strength presented by the built up tension members in this great structure: To what extent would the riveted joints develop under test the strength credited to them by the designers of this structure?

In the official design by the Board of Engineers for the new Quebec Bridge, the demonstrated superiority of the eye-bar seems to have been appreciated and recognized. The board's eyebar chords were double, however, and involved the assumption of a high order of workmanship in boring for their respective connections before it would be permissible to assume that the two sections making up the chord were actually working together in perfect unison.

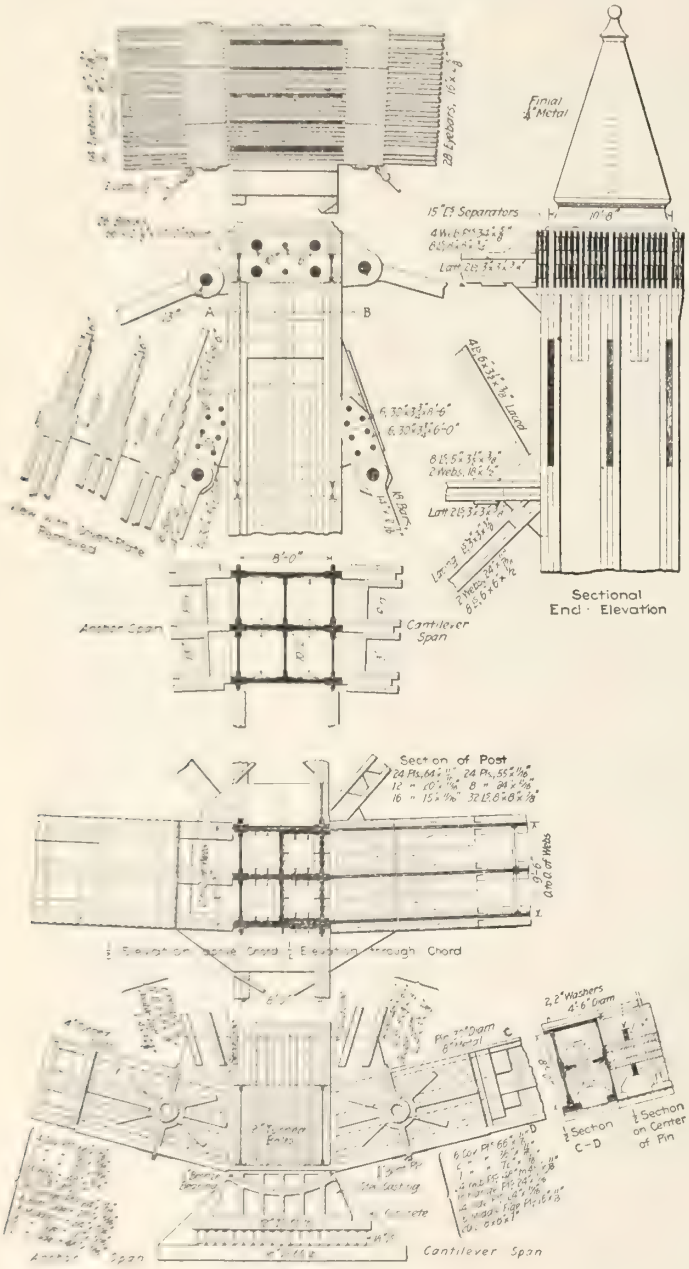


Fig. 3—Base and cap details of main post, Turner's design for Quebec Bridge

This departure from preferable form was explained by the huge section needed in the chords of a structure of the capacity required by the specification. But by the adoption of an economical depth over the main pier, and suitable details, there seems to be no trouble whatever in packing the entire chord on a single pin.

The second proposition demonstrated by the failure of the original Quebec design seems to have been recognized only in a limited way by the members of the Board of Engineers in working up their design for the proposed structure. In the original Quebec design, the metal was concentrated in the webs with little or no flange. In the official design of the board, while a slight improvement in this respect was made, yet the proportion of metal which might be considered flange was insignificant compared to the amount of metal incorporated in the webs, instead of being in the neighborhood of 50 per cent. as should be the case in a well designed section.

As a result of this make-up, small test models of expensive nickel-steel developed no better values than we should expect to secure with the same grade of metal used in the Forth structure provided the metal were distributed on more rational lines.

General Description of Turner's Cantilever Design

The design is for a central span of 1,758 ft. and employs a shore-arm length of 520 ft. The suspended span is made 515½ ft. long. For neatness of appearance and for economy in securing anchorage, concrete approach arches are used. The height of truss over the main piers is fixed at 320 ft., with regard to proper economy of design.

The design contemplates building the structure by cantilevering out to the middle of the suspended span, rather than floating the suspended span in (which is too costly with a span as long as economy dictates). The closing of the upper chord is to be done on permanent wedges. The upper toggles and bottom wedges at the end of the cantilevers, for making the central closure, are to be operated by electric motors.

The width of the lateral trusses is made about 140 ft. at the main piers; this is even greater than in the Forth Bridge (120 ft.). The Forth Bridge has its trusses battered toward the top. In the present design the trusses remain vertical, but converge toward each other from main pier to anchorage and from main pier to suspended span. They are spaced 90 ft. apart over the main pier, 45 ft. at anchorage, and 46½ ft. at the suspended span. The greater width of the wind truss is obtained by placing the roadway outside the trusses and using the roadway chord as wind chord.

Web System.—Mr. Lindenthal has called attention to the fact that both the official design of the board and the accepted design of the St. Lawrence Bridge Company are lacking in economy as compared with the Forth Bridge. The reason for the failure of the official board and the accepted design to secure this economy is of interest. As the writer looks at this question, the lack of economy lies in the multiplicity of main connections to be found in the accepted design of the St. Lawrence Bridge Company, and in the failure of the Board of Engineers to select an economical diagram for the official design.

Comparing the cantilever design accepted with the one suggested by the writer, we find that the top chord, between the main vertical post over the pier and the anchorage, has seven main joints in the accepted design where diagonals and top chord intersect, against two main joints in the writer's proposed design. Between the main post and the suspended span the accepted design has eight such joints against three in the writer's design. Each joint of this kind involves a large amount of metal and runs rapidly into weight, besides adding to the complications of erection.

Although the main diagram is laid out with wide meshes, sub-chords are used for convenience in erection and to assist in distributing the panel-load concentrations into the web.

The diagram outline of this proposed design was worked out primarily from the standpoint of ease of erection and simplicity of details. Rather than allow the desire to obviate secondary stress dictate and determine the character of the diagram, the question of provision for secondary stress was left to be provided for by mechanical ingenuity.

The displacement diagrams of the design (taking into consideration the dead-load after the structure is completed) would indicate large secondary stresses in the diamond frame over the main piers, unless mechanical provision were made to reduce them. Such reduction is accomplished by wedge-pin adjustment of length in the sub-posts forming the lower part of the diamond; as the main post shortens or the ties lengthen, the sub-posts can be adjusted in length so that the sub-chord or horizontal tie crossing the central portion of the diamond is not overstrained. The main shoe details, comprising a hinge, complete this provision from the mechanical standpoint. It will be noted in the diagram selected that a large part of the dead weight is concentrated directly over the main pier. The huge vertical posts and bracing, weighing approximately 4,000 tons, produce no bending moment whatever in the truss proper. In contrast, the official design by the Board of Engineers has its heavy posts arranged on diagonal lines over the pier, involving much difficulty of erection and necessitating heavy temporary members in order to place the finished structure in position.

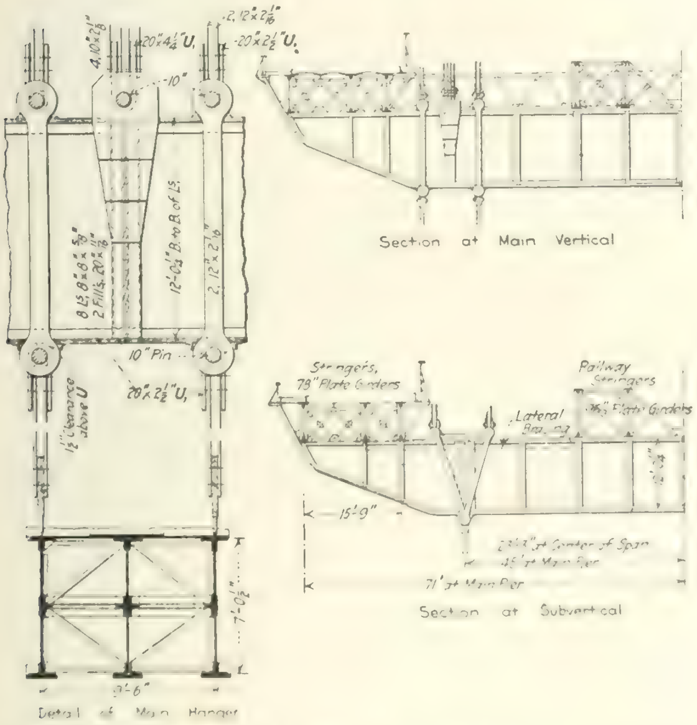


Fig. 4—Cross-sections of bridge, showing hanger construction, Turner's design for Quebec Bridge

Erection Appliances.—In erecting a structure of this type, provision must be made for handling and delivering the material as the work is built out. In the Phoenix design of the Quebec Bridge, heavy girders were attached to the bottom chord, projecting outside of the trusses, and a traveler spanning or straddling the trusses was used. With the proposed design this method of procedure would not be practicable, and the writer's idea was to adopt a mushroom type of traveler supported directly from the steam-railway tracks, and deliver the truss material as the bridge is built outward on the roadway or electric-railway tracks outside of the trusses. In this manner the material may be delivered at practically the point from which it is desired to raise it, and, with the overhanging traveler stayed to the ends of the floor-beams we have thus a simple and comparatively light frame from which to handle the work. The weight of the 1,000-ton traveler used by the Phoenix Bridge Company in erection was made up in large part of the heavy members needed to support the traveler. Eliminating these, as we can readily do through the method of support outlined, the weight of the traveler would be much less than half that which it was necessary to provide for in the original Phoenix design.

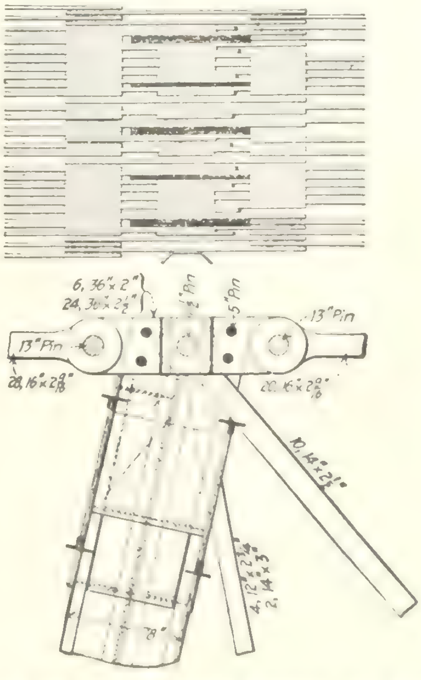


Fig. 5—Top chord joint, Turner's design for Quebec Bridge

Arrangement of Floor.—In the proposed design the roadway and the street-railway tracks are kept outside of the trusses, and the railway tracks are placed between trusses. By this arrangement the dead weight of the roadway counterbalances in a large measure the dead weight of the railway, which reduces the bending moment in the floor-beams very materially indeed.

Wind Chord and Bracing.—By arranging the buckleplate flooring of the roadway in such a manner that it is riveted to the longitudinal stringers, we have a wind chord of unusual section and rigidity, which with a fair amount of diagonal bracing furnishes a wind truss independent of the chord lateral bracing and lying directly in the plane of the floor.

Heavy lateral bracing is provided between the compression chords, while the wind stress in the upper system is provided for largely by transverse or portal bracing.

Compression Members.—The make-up of the compression members is simple in the extreme. Three webs are used throughout the main chords, and there is ample room to work inside. Typical sections of chords and other compression members are shown in Fig. 2.

The characteristics of the chord make-up are: Provision for approximately forty per cent. of the section in the flange; cover-plates covering the top of the heavy section, well riveted to heavy flange angles connecting the webs; no cover-plate whatever for the bottom of the box, but wide flange-plates, giving a heavy flange (24 in. in width) at the bottom of each web; concentration of metal in the centre of each web and the stiffening of the whole box by heavy diaphragms spaced about 7 ft. apart. The construction gives in effect a cellular member of such ample dimensions that the work of riveting up splices, etc., can conveniently be carried on therein.

The make-up of the main posts, like the make-up of the main compression chords, presents approximately the same stiffness in both directions. The post is made up of three webs in the plane of the truss, and a transverse web connecting the centre of these. The webs (parallel to the truss) are each provided with heavy flanges well latticed, a combination which gives a high degree of stiffness under bending from wind pressure, in view of the unusual width of the member, and renders the connection to the upper and lower chords a very simple matter indeed.

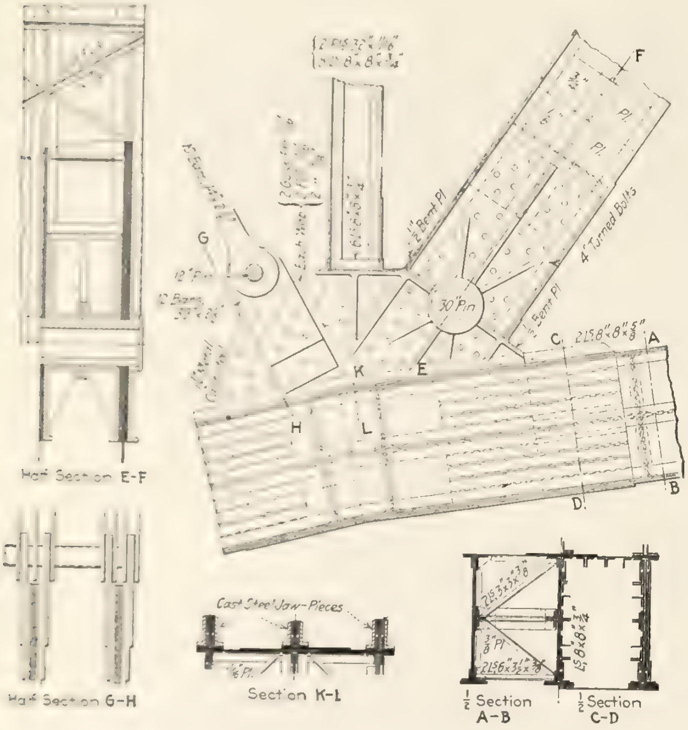


Fig. 6—Bottom-chord joint with cast-steel pin-jaws, Turner's design for Quebec Bridge

To secure an economical as well as aesthetical design of trusses, the upper chord eyebar chain is hung on a parabolic curve and the anchor and cantilever-arm lower chords have each two breaks in direction. The lower-chord members are tapered both in width and in depth from the main pier toward anchorage and suspended span.

The section of the lower half of the main posts is 2,849 sq. in. The lower chord of the anchor arm in the panel adjacent to the main post has a section of 2,155 sq. in., and the maximum section of the cantilever-arm chord is 1,951 sq. in. All these members are of carbon steel. The upper chord in the sections extending from the main post contains 1,348 sq. in. on the anchor-arm side and 1,176 sq. in. on the cantilever-arm side. This chord is made up of nickel-steel eyebars.

Floor Hangers.—The suspension of the floor from the panel-points of the truss is worthy of notice. In the hangers dropping from the main panel-points of the top chord the suspenders are made up in two sections independent of each other, one section taking care of the floor-beam loading directly beneath the panel-points, and the other section continuing to the lower chord and taking care of the truss dead load plus such portion of the live load as is transferred through the sub-system.

These suspender connections, an unusual feature, are illustrated in Fig. 4. The great width of the chord, varying from 8 to 12 ft., necessitates a wide separation of the strands of the main hangers. These are arranged by a spreader to be brought to a central pin, so that there is no eccentricity in the application of the floorbeam load nor will any flexure of the floorbeam under live-load affect this distribution in the least.

Cast-steel Connections.—In an Engineering News editorial regarding the Phoenix design of the Quebec bridge, attention was called to the difficulty of making a satisfactory pin joint without excessive metal in details unless by far the major portion of the section was distributed through the webs. The details presented in the writer's proposed design place these joints entirely outside of the section of the bottom chord, and the forked compression member is practically eliminated. This is accomplished by reinforcing the gusset-plates, which extend above the chord to receive the web members, by cast-steel pin-jaw blocks, as exemplified in Fig. 6. However novel this may be, the detail is not only safe, but also—by avoiding the difficulties above mentioned—distinctly economical.

The same method of reinforcement was employed at the bottom-chord joint over the main shoe. The six cast-steel jaw pieces on each side of the splice between post-gussets and chord provide ample bearing for the pins (Fig. 3).

Turned Bolts in Place of Rivets.—These heavy connections were made practicable by the rather radical innovation of substituting large turned bolts for the rivets. At the splices over the main pier and in most other cases, 4-in. bolts are used, but in some joints 2-in. bolts. They are to be fitted tight to their holes, and forced in by hydraulic jacks; their nuts are then to be screwed up tight so as to pinch the plates firmly together. The writer believes this to be a decidedly novel scheme for making connections.

Double-pin Link Connections.—The top-chord connections of the web necessarily involve forked ends on the compression members. These forks, however, are never longer than three or four times the thickness of the metal. The design of these top-chord joints was simplified effectively by the link construction illustrated in Fig. 5.

Multi-pin Connections.—For certain connections, a group of small pins was laid out, in place of a single pin or rivetting. These pins are usually 5 in. in diameter, but in some cases pins of different sizes are used together. The details of the post-cap and diagonal connection, in Fig. 3, illustrate multi-pin connections.

Rigidity and Weight

Deflections.—The computed maximum displacement at the centre of the suspended span for E-75 loading was 17½ in. For maximum one-sided loading it was estimated that the middle top-chord section of the suspended span would be swung 14½ in. out of line, assuming the lower chord to be held true to line by the floor system and the heavy lateral system in the plane of the chord. An interesting feature of the one-sided loading is the live-load stresses set up in the sway bracing connecting the main posts, due to the convergence of the trusses.

Weight.—In Mr. Lindenthal's article he discusses the possibilities of a cantilever for Quebec, and I regard his discussion as quite conservative, taking exception only to his view that the double-intersection or multiple-system web is economical. Mr. Lindenthal figures that with the double-web system a design should be gotten out with 56,000 tons of steel, using increased working stresses. Using the working stresses provided for in the specification of the board the writer's estimate of weight was approximately 10,000 tons less than the estimate of the board, and this with a saving of nearly $1,000,000 worth of nickel, as nickel-steel was figured on only for the eyebars and some special details.

Labor Organization in Canada

A report on labor organization in Canada has just been issued by the Federal Department of Labor. The report deals with conditions generally as prevailing at the close of 1911 and the publication contains much valuable detail concerning the various unions, councils, federations and national organizations of the country. Statistical tables showing the numerical strength of the various bodies make the report additionally valuable. Where the names of officials are given the information, as far as possible, is for the year 1912. It is interesting to note that of 48 federated organizations in Canada the building trades include nineteen and the metal trades fourteen.

A noteworthy comparison is made in a table which gives in one column the total trades union membership to the total population. Of thirteen countries mentioned this percentage is highest in the United Kingdom, where it is 5.4; in the German Empire it is 4.1; in the United States it is 3.0; in France it is 2.5, and in Canada, 2.0. The percentage is lowest in Hungary and Italy, where it is .4 and .5 respectively. Canada is less highly unionized than many European countries. In the list to which we have referred she stands about midway. While the percentage of trades unions in Canada is much smaller than in the United Kingdom it must be borne in mind, however, that in Canada the proportion of population engaged in manufacturing industries is also much smaller.

The total estimated membership in Canada of trades is 133,132, the Canadian international roll reaching 119,415. The remainder belong to purely Canadian unions.

It is of interest to note that the Industrial Workers of the World, an organization of U. S. origin, has nine Canadian unions representing various industries with an approximate membership of 4,000. The methods of dealing with industrial questions favored by this organization are more radical and drastic than those of other bodies—but this, perhaps, is beyond the pale of a review of the report.

Professor Gibson on Wave Impact

A paper by Professor Arnold Hartly Gibson, selected for printing in the "Proceedings" of the Institution of Civil Engineers, deals with wave impact on engineering structures. The main conclusions to be drawn from the investigation described are that while, on the assumption of simple hydrostatic transmission of pressure, the effective internal pressure due to wave impact cannot exceed that exerted by wave impact on the sea face of a breakwater, the pressures produced, if the energy of the wave is devoted to compression of air in tne open joints, may amount to approximately twice this magnitude. If, however, conditions are favorable to the production of water hammer, considerably greater internal pressures, up to some fifteen times the face pressure with very high velocities of impact, are to be regarded as possible. The results suggest the desirability of providing a free outlet for such water as may percolate to the interior of a sea wall or breakwater, by means of a series of weep holes or drains opening on its sheltered face. Such drains, preventing the accumulation of internal water, would be an effective guard against the production of internal pressures of sufficient magnitude to affect the stability of the structure, whether due to water hammer or to air compression.

Electric elevators for pedestrians and vehicles are features of the tunnel under the Elbe river at Hamburg, Germany. There are six of these elevators operating in the vertical shafts at each end of the tunnel and separate equipment takes care of the traffic in each of the two directions, thereby avoiding crowding at the entrances and exits. In the tunnel the traffic is handled through two tubes, each about 13 ft. 6 in. in diameter and 26 ft. on centers, which are located about 20 ft. below the bed of the river. The tunnel is about 1475 ft. long with the outlet shaft on the left bank at Steinwarder and that on the right at Saint Paul. These shafts are each about 72 ft. in diameter and the one at Saint-Paul was excavated entirely in open cut. The work on the left bank, however, required the use of compressed air.

When completed, the new London Building, which is being erected for the London and British North America Company will be among the finest buildings in Vancouver. This structure will have a frontage of fifty-two feet on the south side of Pender street, half way between Granville and Seymour streets, and will extend back 120 feet. It will be ten storeys in height with a full basement. The new building will be on a reinforced concrete construction throughout, and will be absolutely fireproof. One feature of the construction is that wherever possible, British or Canadian material is to be used. The front is to be completely faced with Haddington Island stone richly carved and surmounted by a cornice of the same material. The east, west and south sides are to be covered with hollow brick. The partitions are to be hollow clay tile and the floors in all the halls and corridors are to be of terrazza tiling with marble borders. On all the elevations, with the exception of the front, the windows will be of the self-closing metal variety, glazed with patent wire glass.

Laying Out and Planning Construction

An Economic Discussion of the Planning of a Piece of Railroad Work, with Comments on Sub-Contracting[*]

THE planning and laying out of a piece of work is always a difficult problem. To the experienced man it comes to be a more or less ordinary matter, but to the young man, just starting out in the difficult field of contracting, it is an extraordinary undertaking. He is almost sure to approach it either with fear and trembling or with too much confidence. Self-confidence is a good quality to possess, but in contracting, if you haven't a good amount of knowledge and experience to back it up, it is likely to lead to loss of money or perhaps complete failure. It is especially unwise to be too cocksure of oneself in laying out and planning work. This initial work on a job is a matter of infinite detail. Every item of the work must be studied intelligently before it is impossible to decide on the best methods of procedure.

An Example in Railroad Work

The planning and layout of a certain piece of railroad work will serve as an example of good thinking along these lines. The job in question involved the construction of thirteen miles of new line, an extension of a coal road into the mountains. There was some very heavy rock work, necessitating the construction of five tunnels. There was one steel bridge and timber bridges requiring four or five million feet of lumber. The work cost, on an average, more than fifty thousand dollars a mile, and a year was allowed for its completion.

For the greater part of its length, the line followed the course of a small stream through the mountains. Four of the tunnels, located near one end of the line, had to be bored through solid rock, while the fifth, situated near the other end of the line, was about 700 feet long, and was built through soft earth. The steel bridge was near the end of the existing line, but the timber bridges were scattered along the line and there was no way of hauling by wagon the timber necessary for their construction.

There were three bases of supplies—the terminus of the line already built, another railroad about five miles from the center of the work, from which fairly good hauls could be made to several sections of the new line, and the branch line of a competing road, that extended to within half a mile of the soft tunnel. Any part of the work was within five or six miles from one of these points.

The first thing the contractor did after the contract was given to him was to accept by letter the lowest quotations on all materials on which he had obtained prices before bidding. That done, he got together his data and put his mind to planning an effective layout.

Before the contractor had submitted his bid his engineer had gone over the line and had made notes concerning every detail. He had selected camp sites, possible quarries and sand supplies. He had listed all the quantities of the various kinds of work to be done, in several schedules, which showed waste and borrow of earth and rock, possible classification of material disposition of all excavation, the materials to be bought, and the haul necessary to bring them to the scene of the work. From this data, together with the map and profile of the work, and with other information furnished by the engineer, it was possible to plan and lay out the job. The time schedule was the first thing to be attended to.

Dividing Work into Sections

In making up a time schedule it is necessary to estimate the plant and forces needed, and to do this, on such work as railroad construction, the work must be divided off into sections. If the work is to be done by the contractor's forces, a different plan of division is likely to be adopted from the one used if the work is to be sublet. When engineers lay off their work they usually divide it into sections a mile long. This is a very easy method for them, but not always so for the contractors. If the work is to be sub-let, it should be divided off so that material from one section will not be hauled onto another. Insofar as it is possible, similar classes of work should be grouped together, since a man with a scraper outfit is not likely to want to take out a rock cut. Steam shovel work should be let in separate sections and a long tunnel can often be called a single section and sub-let to advantage. If possible, there should be on each section one attractive piece of work upon which forces can be worked in bad weather. If the contractor's own forces are employed throughout, the work should be divided with reference to the position of the construction camps where plant and men are located.

The particular railroad job in question was divided into sections for sub-letting. These sections were submitted to the engineer for the railroad company and received his approval. For each section, excepting the first, plant and force of men sufficient to finish the work in eight months was estimated. The first section was to be completed in from five to six months, since the steel bridge was on it and it was necessary to get track down so as to place the steel for the bridge. The camp on this section was also needed for the forces that were to erect the timber bridges, which were all located on the first five or six miles of the line. All the timber was to be brought by train to a yard on the first section, and there framed and carried by a construction train to the various bridge sites; for circumstances rendered it impossible to haul the timber by wagons and do the framing and erecting on the ground.

All of this above work was included in the time schedule, as well as the masonry work; for the bridge abutments and the small piers for the timber bridges had to be built in advance. The culvert work was also recorded. The number of forces and the length of time necessary for the excavation of the important cuts and tunnels were carefully noted. The number of yards to be moved each month on each section was set down. With such a schedule it was very easy to see if the work was lagging, and steps could be taken to hasten it.

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[*] By Dauiel J. Hauer, in the Contractor, Chicago.

Importance of Time Schedule

Too much importance cannot be given to the time schedule. Not only does it set forth the plant and forces needed on the work, and the rate of progress necessary to complete the job on time, but the financial arrangements can be more intelligently made after the schedule is made out.

On the construction of the coal road the next step taken after the completion of the schedule was the making of the financial arrangements. It was very easy to ascertain the amount of money needed to start the work, when the number of men to be employed, and the length of time the work would take were known. The first month's progress was bound to be slow, but with the probable amount that would be earned each month, and the probable cost of carrying on each month's work estimated from the schedule, it was not difficult to see during what months the work ought to carry itself, and when assistance would have to be given on the various sections.

It is necessary to make an estimate of monthly cost and profit, not only when the contractor's own forces are to be employed, but also when a sub-contractor is doing the work. The mere getting of a contract does not build anything. Eternal vigilance is always the price of success in making money. A sub-contractor needs looking after, and always needs the support and assistance of the general contractor. If he needs financial aid the general contractor should help him arrange for it, since the failure on the part of the sub-contractor to finish his part of the work may mean a loss of money on the whole job. Thus the interests of the sub-contractor become those of the general contractor.

General Contractor's Responsibility

After the financial arrangements have been completed it is time to start work on the job. In sub-letting work the form of contract used should always be equitable, but it should, at the same time, protect the general contractor. He is responsible for all the work. He furnishes the bond and altogether has much more to lose than the sub-contractor. On the other hand, the sub-contractor may have little if any money; he may have a poor outfit, and be badly equipped for work, yet with the assistance of the general contractor, he may finish the work in a first-class manner, and on time, making money for himself and the general contractor. If the sub-contractor is an honest man, meaning to do good work, he will not object to signing a contract that will allow his employer to be the judge of the progress being made, of the outfit and forces necessary for the work, and of a few other like details. It is poor policy to demand a bond of sub-contractors, for if trouble occurs with them a bond only complicates matters.

On the railroad we are concerned with, the entire grading work was let to twelve sub-contractors, the sections ranging from half a mile to a mile and a half in length. Some little of this work was earth and could be done with scrapers, but the most of it was rock. Some of the cuts were from fifty to seventy-five feet in depth, but none was very long. No more than one tunnel was put upon any single section, although in one instance, a rock tunnel about 500 feet long was separated from another 200-ft. tunnel only by a small embankment. Under ordinary circumstances it would have seemed advisable to let both of these tunnels together, but the man who took the section with the small tunnel on it insisted on having a tunnel, and it was given to him, although at the outset it was thought that he would not do the work with dispatch. It turned out that although he did the rest of his work well he neglected the tunnel, so that within a few months it was taken away from him and included in the other section.

The soft tunnel, with a few adjoining small earth cuts, was made into one section, and the entire work of excavating, timbering and lining was done as one contract. The railroad station close by served as a convenient point at which to receive the necessary materials for the tunnel. This was a slow job, but since it was within a mile of the far end of the line it did not retard any of the other work. Some coal mines located close by made it difficult to keep laborers at this point.

In letting the grading work the masonry and pipe culverts were included in the contracts. As a general thing either this method may be followed or the culverts and grading may be let separately. In the writer's opinion the better plan is to include the culverts in the grading contract; for when let separately, the grading contractor may be delayed, waiting for the culverts to be built. If they are included in his contract he has the control of the situation and if he does not wish to construct them himself he can sub-let them.

In sub-letting the work on the railroad in question the outfit each contractor was to have was listed in his contract. This, together with frequent inspection of the work and weekly reports of the forces engaged, assured the general contractor that the time schedule would be lived up to.

While the work was being let the warehouses were being built to receive the supplies and materials for the work. One was near the soft tunnel, one near the centre of the work and the third at the other end of the line. From these warehouses the sub-contractors received their supplies. At the point near the center of the work the office of the general contractor was established.

Bills for the pipe needed in the culverts were secured at once, and the pipe was ordered, giving points of delivery and dates for shipping. It was arranged so that the material should come in plenty of time and in such quantities that the cars could be released promptly. This saved demurrage and also made it easier to meet the payments, as much of this pipe could be placed by forces organized for the purpose, so that the payment for it was received from the railroad company before the manufacturer's bills fell due. Such details are always important, and mean much in arranging the finances of a job.

The cement needed for the work was estimated and contracted for, quotations having been previously secured on a rough estimate. A contract was also entered into for the explosives needed.

The masonry work for the bridges was let separately from the grading to contractors who made a specialty of that class of construction. They immediately began to get out stone and started the excavation for the foundations. The timber bridges and track laying were to be done by the general contractor's own forces.

Satisfactory Method of Sub-Letting

In letting all of this work the general contractor set the prices. There are several methods of arranging prices in sub-letting. One is to have the sub-contractors submit bids on the work, in the same manner as for a general contract. This method is hardly to be commended for several reasons. The sub-contractor may bid higher prices than are being paid for the work, which would result in a waste of time for both parties concerned. Or the prices bid may not allow a reasonable margin of profit for the general contractor, especially if the sub-contractor should for any reason fail to carry out his contract. Again, the prices bid may be so low as to give the general contractor an excessive profit, and in all probability cause a loss to the sub-contractor. These are all good reasons against sub-letting work in this manner, and there are no equally good reasons in favor of it.

Some contractors sub-let work by making known their contract prices, and reserving ten per cent. on those prices for themselves. Unless the original contract is shown, this method nearly always causes trouble; for the sub-contractor will later hear rumors concerning the prices the general contractor is getting and will at once conclude that the general contractor is acting in bad faith with him. Accordingly a hard feeling springs up, and the two, whose interests should be identical, work against one another. This method of letting is, moreover, not always equitable. It sets uniform prices for each section, when some sections, if divided off properly can be done for much less than others. In consequence, one sub-contractor will have a handsome margin of profit and another little, if any, profit. This fact may prevent sub-contractors from taking certain sections, and the owner may be forced to do them at a loss, with his own forces under hired superintendents.

The best method of sub-letting, in the writer's opinion, is for the contractor to name his prices. The almost universal custom seems to be for the subcontractor to allow the original contractor to have a gross ten per cent. On this basis prices can be named as an average and in sub-letting the two parties can vary a little to suit conditions. In this way the subcontractor can refuse the work, if he wishes, without have gone to any great expense, or he can "dicker" until he gets a price that will suit him. It is not any concern of his what prices the general contractor is getting. On exceptionally fine sections the prices can be less than the average price, thus giving a margin to be added to difficult and expensive sections.

This method gives the sub-contractors a fair deal and also allows the general contractor to make an average profit of ten per cent. on the entire job, although he does not make the same per cent. on each section. It is necessary to remember that if the contractor did the job with his own forces his profit would vary exceedingly on the different cuts as well as on the different sections. The sub-contractor must make all his profit on one section. There are occasions when it will even be necessary to pay the subcontractor the same prices as those received by the general contractor. In such cases the sub-contractor should be known to be a man who will stand by his agreements. The writer has had extended experience both in letting sub-contracts and also as a sub-contractor, so he speaks with an intimate knowledge of both sides of the question.

As soon as possible, after a job is started, a contract should be made with a steel manufacturing concern for any steel bridges that may be required. Contracts can be let separately for the fabrication of the steel and the erecting of the bridges, but, as a rule, the most advantageous contract for a general contractor to enter into will be one which provides for the doing of both classes of work by the same company. A provision should be made that the steel company shall furnish its own false work if any is needed. In drawing up this contract, care should be taken to provide for the delivery and storage of steel; otherwise the contractor may find his small profit on the steel work eaten up, by having to receive and store the steel and to rehandle it to the site of the bridge. Many contractors have suffered by signing contracts of this nature hurriedly.

Bills for timber for the wooden bridges should be obtained from the engineer as soon as possible and arranged for use. Many contractors simply copy these bills, making copies for framing and erecting and others for the saw mill men. This is an expensive way to do. As a rule the engineer makes the bills for the bridges up by bents, although at times the various sizes are lumped together. The contractor should arrange the bills for erecting and framing by bents, so that no mistake can be made in this field. The original copies received from the engineer should not be changed in any manner and should be filed for reference.

The prices for sawing all the different sizes of timber for each structure and also for the entire job should be lumped together. Prices for the various sizes can be obtained from different saw mills and dealers. Many of the quotations made will vary a great deal. All of the prices received can be tabulated. Then by a little labor and the use of arithmetic, bills for sawing can be made up, whereby each mill or dealer can be given sticks to furnish at the lowest prices, and yet each order will carry large and small timbers, so that a run of logs can be used to advantage. The contractor who buys several million feet of lumber in this manner can save himself much money and the extra labor he spends upon the matter will be many times compensated for. With the order numbers at hand it is very easy to keep a record of the structure in which each carload of timber is to be placed.

On the job we are discussing all of these things were planned for and the various details were recorded in a book for quick reference. Copies of such information as the sub-contractors and superintendents would be likely to need were made and sent to them, with letters of instruction or transmission.

After the grading was started the track laying was arranged for. The receipts and storage of ties, rails, plates, bolts and spikes was tended to promptly, so that when the time for track-laying came, there was no delay and the building of the bridges was not held back.

Planning work is all well enough, but it will prove useless if someone does not see that the plans are lived up to. A competent man should make frequent trips over the line to see how things are going. Daily, weekly and monthly reports should be required and progress charts and profiles should be made. Then, as the work progresses, the time schedule and progress charts can be referred to and any errors or omissions can be corrected at once. Each month's financial arrangements can be looked after several weeks ahead, since a money shortage on a construction job is a serious thing to face unexpectedly.

The final achievements of the world have been wrought out by those who have despised the proof of the impossible.

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The last issue of the city directory gives Vancouver a population of 170,000.

Piecemeal Development in City Planning

Civic Improvement at the Federal Capital—Haphazard Methods Severely Criticized — Departmental Art "Indifferently Bad"

IN an article outlining the possibilities of the future development of the city of Ottawa, our London contemporary, "The Builder," makes some interesting observations with which we are in accord. While commending the work of the Ottawa Improvement Commission, our contemporary criticises the improvements made by that body as being "merely piecemeal and isolated" and as having no relation to any sufficiently comprehensive scheme. The Improvement Commission, it is urged, should be merged in a special commission created by the Government and endowed with town planning powers. Our contemporary's further observations, which are reproduced below, are noteworthy, particularly in regard to the present opportunity for civic improvement schemes in Canada.

Although such a Commission must no doubt consider the future of the city from many and various points of view, the aspect which naturally appeals most to us is that of its development as the capital city of the Dominion. This seems to be the one governing feature of the situation, the factor which differentiates it from all other Canadian cities and provides the ruling idea of the general lay-out.

This no doubt could be fully realized by any properly constituted Commission that may be appointed, and it is to be hoped that the Canadian Government will see the necessity of securing the advice and assistance of the best architectural talent available.

Canadians are perhaps too fond of referring to Ottawa as the "Washington of the North," but if its future development is left in the hands of those best qualified to advise there should be no fear that any attempt would be made to copy Washington or to force upon this extremely interesting and unusual site any arbitrary forms which are not the logical outcome of the necessities of the case nor inspired by the natural charm of the situation. While not rivalling Quebec, perhaps, in the scale and grandeur of its natural setting, Ottawa has a unique charm and distinctive character of her own which at all costs should be preserved. No capital city in Europe, with the possible exception of Budapest, has finer natural advantages or more romantic possibilities, and it would be nothing short of a disaster if the most is not made of such a magnificent opportunity.

It is, we believe, rather the custom in Canada to hold that the country is too busy in other directions, and is not yet rich enough to undertake great town-planning schemes, but that later on, with more leisure and more wealth, they could be dealt with to greater advantage. If, however, we are to judge from the experience of this country, Canada will never be better able to afford them. Here such schemes are considered impossible because of the enormous value of the land and vested interests concerned, and it is customary to lament the fact that they were not carried out long ago when land was cheaper and when, presumably, the country was poorer.

Be this as it may, the sojourn of the Duke of Connaught at Ottawa, as the first Governor-General of the Royal House, seems to suggest that no moment could be so appropriate as the present for the initiation of a fine comprehensive scheme to render the city more worthy of her high destiny.

Another important matter with which our contemporary deals is the generally unsatisfactory character of the designs for public buildings produced by the Department of Public Works. If the best that can be said for departmental art in England is that it is indifferently good, says "The Builder," the best that can be said for it in Canada is that it is indifferently bad, while the worst designs are "simply deplorable." The fault lies not with the officials but with the system, the article continues.

Dominion Architectural Department "Antiquated and Inefficient"

Although it might be possible to improve the standard of work by thoroughly reorganising the Department and offering salaries that would attract first-rate men, there is not the slightest doubt that the system is inherently vicious and that the Government would be well advised to make a clean sweep of it and give all public work to the most competent architects in the Dominion.

Indeed, the existence of this Department, with its antiquated and inefficient methods, appears to be particularly unfortunate in view of the proposed development of the city. If a Town-Planning Commission is to succeed it needs a free hand and undisputed authority. The creation of such a Commission would seem to be a good opportunity for closing the Department and conducting the architectural affairs of the State by more efficient and up-to-date methods.

Although many of the more recent buildings in Ottawa designed by independent architects are of a high standard of excellence, the city is developing in the usual haphazard manner. If any satisfactory scheme for the city is to be evolved it is evident that some limitation as to heights must be mutually agreed upon which will enable such problems to be solved with equal satisfaction from the point of view of the city as a whole.

A trackless trolley line to assist horse-drawn vehicles up heavy grades has recently been put in service at Altona-on-the-Elbe in Germany. One of the main thoroughfares of the town has an average grade of 5.5 per cent. for about 3,200 feet, and previous to the installation of this service extra horses were required to assist heavily loaded trucks up the hill. The motor-wagons now used have two trucks and can turn in a 16-ft. radius. They have electric motors capable of developing from 25 to 40 h.p. and handle loads up to about 7 tons. Each motor waggon weighs about 6 tons and has a maximum speed of 6 miles per hour. They take current from a 550-volt line by means of Schiemann trolleys, which are taken down when the motor runs down hill. According to "Engineering," one of the features of the system is the uncoupling while the loaded truck is in motion. This is said to be essential for the [illegible] and likewise saves time lost in stops.

Business is extremely active in Lethbridge at the present time. The C.P.R. will erect an immense office building, and it is proposed to make the city the centre of the telephone system for that district.

The Use of Concrete in Road Construction

A Great Field for Careful Experimentation—Practical Considerations —The Question of Maintenance—Changing Traffic Requirments*

By Logan Waller Page†

FOR some years, the best practice in city streets construction has called for Portland cement concrete foundations. Used for this purpose, concrete has proved more satisfactory than any other material, and no improvement could reasonably be expected.

During the past ten years probably more experiments with road materials have been made than in any other period in the world's history. The new traffic conditions brought about by the automobile have almost completely upset our standards for rural and suburban roads. During this time much experimenting has been done with the object of making concrete available as a road material. Up to the last four or five years, however, I think it can be safely said that concrete as a road surfacing material has in most cases not proved altogether satisfactory.

While this is true in general, yet there are isolated instances where concrete has been used for road construction with such a degree of success, that complete success seems to be almost in sight. This fact alone, it seems to me, justifies an assumption that concrete can be made generally successful as a road material, provided sufficient care is used in the selection of materials, their mixing, laying, and curing, all of which necessitate skilled supervision.

Probably no form of construction requires greater homogeneity than that of a road surface, as no other structure is subjected to more severe chemical and physical wear, and a successful road must wear uniformly and smoothly.

From the best information obtainable, it appears that great variation has existed in the construction of Portland cement concrete pavements up to the present time. Pavements have been laid, in many cases, in two courses, and, in a considerable number of places, in but one course. A great variety of proportions have been used for the foundation course and for the wearing surface where two courses have been used, and almost as many variations in the proportions where a single course has been laid.

General Rules

In the absence of definite information as to the behavior of these different mixes, laid either in one or two courses, it is yet too early to attempt to predict what will ultimately be found to be the best and most economical method of constructing these pavements. Portland cement concrete has been used so successfully in nearly all forms of construction that it seems reasonable to expect that we cannot go far wrong in using concrete for a pavement if we adopt the best standard practice in use to-day for other types of construction.

First, we should select only Portland cement which will conform in every respect to the standard specifications for that material adopted by the American Society for Testing Materials, and all cement should be tested before it is used.

Second, sand should be clean, sharp, coarse and well graded, and may contain not to exceed 5 per cent. of loam or clay, provided organic matter is not present.

Third, the coarse aggregate should be composed of clean, hard, sound rock; of gravel of a good quality; or of hard, dense, crushed blast-furnace slag. The coarse aggregate should be broken or screened so as to be retained on a ¼-in. mesh and pass in any direction through a 1¼ in. mesh. Clean water free from strong acids and alkalis, of course, should be used in making concrete.

A sufficient amount of cement should be used to a little more than fill the voids in the sand, and a sufficient amount of motar should be used to a little more than fill the voids in the coarse aggregate. The mixing, of course, can be either done by hand or by machine.

No definite rule can be laid down for proportioning materials, but, as a general proposition, probably a 1:2:4 or a 1:3:5 mix will, in most cases, give satisfactory results.

It is evident that a great field for careful experimentation is open here, upon the results of which will largely depend the economical construction of future concrete pavements.

Directions for Laying Concrete

Assuming that our foundation is as carefully prepared, and as thoroughly drained and compacted as would be necessary for the best form of pavement, the concrete must be carefully placed, spread, and compacted by tamping to a uniform thickness of six inches or more, the thickness depending upon the character of the foundation and the character of the traffic to which the pavement is to be subjected.

I believe one reason why many concrete pavements have failed in the past is because the concrete has been improperly cured before traffic has been allowed upon it. We know that concrete cured under water attains a greater ultimate strength than that cured it air. For this reason, I would recommend a fairly wet mix and for a period of from one or two weeks after the concrete has been laid that the surface be kept thoroughly moistened by sprinkling. If provision can be made for keeping the sun from coming directly on the surface, this should prove very beneficial. This protection can be accomplished by covering the surface of the concrete with loam or other soil of which the shoulders of the road are composed. True, such protection will add to the expense of the pavement, but I believe the additional cost will be more than offset by the increased strength of the concrete. In the case of city pavements, this protection might be accomplished by covering the surface with straw, sawdust, or shavings.

It occurs to me that further opportunity for the concrete to gain additional strength would be provided at slight expense if, after the curing just mentioned has been completed and the loam or soil has been removed and the surface allowed to dry, a thin coat of bituminous material be immediately applied. This form of construction was used at Ithaca, N.Y., by the Office of Public Roads, in 1909, and I am told, at Ann Arbor, Mich., for the past three seasons. It seems to me that it would materially lessen the shocks from traffic, and if only one bituminous coat were applied and allowed to wear off, it would be worth the additional cost as a protection to the new concrete.

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*[illegible] Association of Portland Cement Manufacturers.

†[illegible] Office of Public Roads.

Experiments indicate that concrete upon drying exhibits shrinkage, and, at the end of six months, the shrinkage amounts in fairly dry concrete to ¾ in. in 100 feet. This is as much contraction as would be caused by a change in temperature of over 100 deg. F., showing that the effect of moisture in causing the cracking of concrete is certainly as great as, if not in excess of, that due to change in temperature. If means could be provided for preventing the drying out of the moisture, much of this shrinkage would be prevented. The consequence would be a more solid mass of concrete.

The bituminous top just described would prevent the rapid drying out of the concrete mass, and, therefore, prevent the formation of many of the cracks which would otherwise occur. Provided cracks did occur, the bituminous covering would be immediately driven into these cracks by traffic, and the cushioning effect of the bituminous top would prevent chipping and spalling of the concrete at these cracks.

Joints

Undoubtedly, provision must be made for expansion and contraction. While unable to state exactly what this allowance should be, the best practice up to the present time seems to call for an expansion joint ⅜ to ½ in. along each side of the pavement at the curbing in the case of streets, and a transverse expansion joint about every 25 ft. Experience may show us, however, that these transverse joints can be placed further apart.

My examination of concrete pavements so far laid has indicated that a transverse joint of a half inch filled with suitable paving pitch makes a satisfactory joint, and prevents chipping at the edges of the concrete.

On account of the dense surface, a crown of ¼ in. to the foot is probably sufficient for concrete pavements. Such a flat crown is very desirable on any pavement, on account of its tendency to distribute the traffic over the entire width of the pavement. By the use of different floats, almost any kind of a surface finish can be obtained. For ordinary traffic, of course, too smooth a surface is not desirable, on account of its tendency toward slipperiness.

Maintenance

One feature of the best Portland cement concrete pavements that looks particularly interesting is the probable low cost of maintenance. I have reports from the city engineer of Portland, Me., of 17 sections of concrete pavement built by the grouting method, the oldest of these pavements having been laid in 1907. Several sections have been laid each year since. The reports indicate that there has been no maintenance expense on any one of these sections. Portland is a city of about 55,000 inhabitants, and many of these concrete sections are subjected to excessive traffic on streets with double car tracks. Several other instances have been brought to my notice where substantially no maintenance charge has obtained on concrete pavements from three to five years old, and where the wear is practically slight.

Figures collected by the Office of Public Road relative to the cost of maintenance of plain macadam and bituminous pavement under fairly heavy traffic conditions indicate that these pavements, when properly maintained, entail an absolute maintenance charge of approximately $450 per mile per annum for plain macadam, and possibly from $800 to $1,000 per mile per annum for bituminous macadam, for 15-ft. surfaces. These figures have led me to believe that we must seek a more permanent form of pavements for country road surfaces. I hope that the concrete road will meet this requirement.

Advantages of Concrete

In the matter of sustaining normal loads the capacity of concrete pavements as compared with the capacity of ordinary macadam or bituminous macadam surfaces must be superior. Numerical data and experimental evidence on this subject are as yet meagre. It is not difficult, however, to draw certain definite conclusions when we consider the nature of the materials involved. It is well known that macadam roads have rutted under heavy loads. For ruts to develop rapidly it is quite evident that some shearing of the macadam surface occurs. Of course, rutting also takes place because of wear and lateral displacement of stone. The capacity of concrete pavements to resist shear is relatively much greater, and we may perhaps note this is the first point of superiority of concrete over macadam pavements for sustaining normal loads.

It is common practice to assume, in designing concrete bridge floors, that normal pressures over an area are transmitted through the slab in lines of pressure whose boundary surface is conical, with elements at an angle of 45 degrees or more with the horizontal. It scarcely needs demonstration that the same assumption cannot hold for macadam slabs, i.e., normal pressure cannot be transmitted by a macadam slab over as large an area of the sub-grade, and this, it is reasonable to record, is a second advantage of concrete over macadam construction.

We may, if we choose, compare concrete road surfaces with macadam road surfaces, assuming that each is an arch between curbs. It is not difficult to see that concrete is superior as an arch in the following way: Consider the entire sub-grade carefully removed from a macadam road surface; there is some doubt as to whether the macadam surface would stand alone. On the other hand, it is easy to see the complete concrete slab crown not only standing after the removal of the sub-grade, but to also see this arch of concrete sustain considerable load without a sub-grade, so that we must admit the third superiority of concrete roads over any macadam construction in their action as an arch to sustain normal pressure.

Traffic to be Sustained

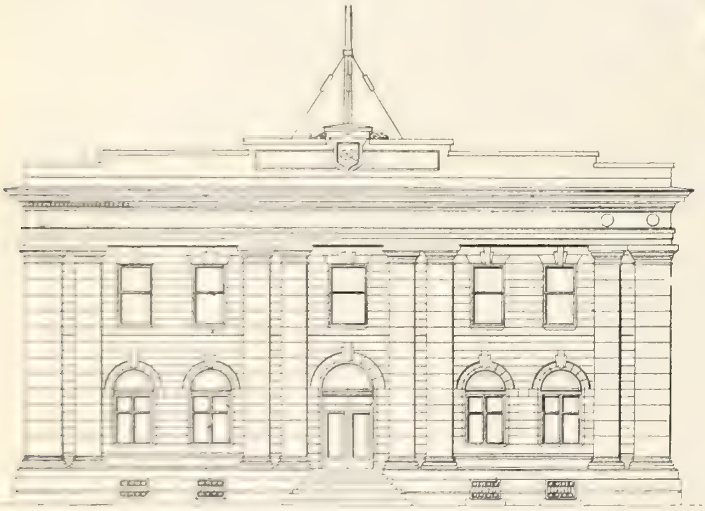
Up to the present time, we have not been concerned greatly over the presence of heavy loads upon our roads. There is now, however, evidence that we cannot place an upper limit on the loads which may be expected to travel almost any newly built road. The practice of delivering coal, for example, in large quantities by motor trucks is rapidly increasing. In the vicinity of cities, there seems reason to believe that this practice may wholly supplant the delivery of coal by wagons in small lots. We must frankly admit that whatever method of transportation over roads proves the most economical will be adopted. It does not seem likely that in the long run restrictions upon the weight of loads will increase, and therefore it is evident that future road surfaces must be constructed with an ample factor of safety, in view of probable increase of traffic, both numerically and in unit tonnage.

From the comparisons made above between Por and cement concrete and plain macadam or bituminous macadam, it is evident that we may be practically assured that the Portland cement concrete road is far better able to meet the changing traffic conditions than either of the other surfaces. From our knowledge of the strength of Portland cement concrete, we can design a road surface of this material to meet the requirements of practically any traffic.

In conclusion, I desire to state that I believe concrete roads can be built that will successfully meet all modern traffic conditions, if sufficient care is exercised in their construction. It may be too early to express an opinion on the maintenance costs of such roads, nevertheless, with proper supervision, I venture the prediction that they can be brought to a lower figure, under equal traffic conditions, than macadam roads.

Post Office, Maisonneuve, Que.

FOR the Federal Government, Mr. C. A. Reeves, of Montreal, has designed a post office which is to be constructed on Ontario street, Maisonneuve, at an estimated cost of $60,000. The building will consist of two storeys and a basement, the exterior on three sides being of stone, the interior walls of cement, and the roof of terra cotta and cement. The size of the lot is 100 x 125 ft. Provision is made in the plans for four entrances, two being for the mails. In the basement there will be lavatories, vaults, furnace, &c. On the ground floor there is to be a public lobby, and dividing the public from the clerks' offices there will be a partition of wood and marble. Here are to be located the stamp department, boxes, inquiry offices, &c., while at the side will be the registration office. All the postal business will be transacted on the ground floor, the second storey being devoted to living accommodation for the postmaster. The rear portion of the ground floor is only one storey in height, the light being derived through a large skylight.



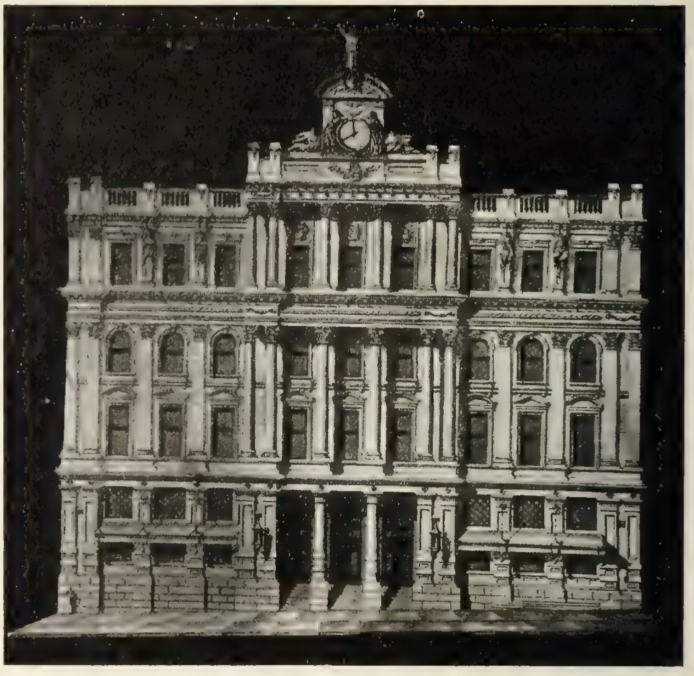
Front Elevation Maisonneuve, Que.

A 70-ton Bucyrus steam shovel, used on the Panama Canal excavation work, recently loaded 2900 cubic yards of material in a working day of eight hours. During this time a delay of 1 hour 50 min. was incurred by waiting for cars. This is the best record yet made by a 70-ton shovel since the work was begun by the United States.

General Post Office, Montreal

WORK is now proceeding on the remodelling of the General Post Office, St. James street, Montreal. The postal business is being carried on in a new section, and when the work of remodelling the old portion is finished, the result will be a complete structure, combining the old and new sections, and running from St. James street to Craig street. The cost of remodelling will be about $200,000.

The alterations are so drastic that practically a new structure will be put up. The entire inside has been torn down, the outside walls only being retained. Another storey has been added and various modifications have been made in the main exterior on St. James street. It will be noticed from the illustration that four cariatides have been added, representing Europe, Asia, Africa and America. These are 12 ft. 6 in. high and are constructed of stone. The old portion of the front is to be cleaned by the Canadian Sand Blast Company. Marquees will be added on each side of the building.



Remodelled General Post Office, St. James St., Montreal

The interior construction will be of fire-proof material, the floors being of concrete and terra cotta. The basement will be devoted to the receiving department, and here also will be situated the lavatories. The feature of the ground floor will be the lobby, where receiving boxes, stamp offices, telephones, and telegraph office will be located. The first floor will contain offices for the Postmaster-General, the Montreal Postmaster, and his assistant, and general offices; while on the ground floor will be the money departments, registration, &c.; and the third floor will be occupied by the Customs.

The ground floor will be of mosaic, with marble dados around the lobby. The plans provide for a space right down the centre of three floors, the various offices being arranged on the sides. The floors of these spaces will be of tile, with marble dados on the sides, the remainder of the floors being of birch. The fittings will be of oak.

The staircases will be of iron. Five elevators, two passenger and three freight, will be installed. A special system of ventilation is to be put in by the Buffalo Forge Company. The architect is Mr. Theo. Daoust, of Montreal. The general contractor is Mr. J. Bourque.

The Manufacture of Fire Clay Goods at Clayburn, B.C.

Interesting data concerning the manufacture of special shapes in fire clay goods, such as lining blocks for Portland cement kilns, cake ovens and smelters, etc., are contributed by Mr. J. B. Millar, manager of the Clayburn Company's plant at Clayburn, B.C.

The fire clay is first taken from the mine and is usually found in proximity to coal. In the Clayburn Company's mine there is a seam of coal between two seams of high grade fire clay. Each of the latter is from nine to fifteen feet thick. After the clay is brought to the works it is ground in a dry pan, a portion of calcined clay being mixed with it. The proportion depends somewhat upon the class of work for which the particular batch of material is intended. The clay is then mixed thoroughly in large pug mills, tempered and placed on the pressing floors for the workmen. This work is almost invariably done by hand, pressers filling the moulds much in the same manner as in the case of architectural terra cotta, although the same degree of care in finishing is not required. The pieces have to be examined and cleaned up carefully, after which they are dried on the drying floor and set in the kilns with fire brick, as they require to be burnt at a very high temperature—usually 2,400 deg. to 2,500 deg. The fire is started very gently with either wood or coal and slow fires are kept in for about 48 hours. By this time the heavy blocks are thoroughly warmed through and there is little danger of cracking, so the heat is greatly increased until burning point is reached. The total time required for burning is from six to seven days. The Clayburn Company use pyrometric cones to indicate when the process is nearing completion. The goods are also tested after being taken from the kilns. When the firing is completed the kilns are sealed up. Some hours are allowed for annealing after which the fans are allowed to draw the head from the kilns until they are cool enough for handling.

A corner of the Clayburn Company's Plant

Some of the blocks may be seen in the accompanying picture. Sewer pipe of the Clayburn Company's manufacture is shown in the foreground.

Wooden floor forms for the concrete deck of the Bronx viaduct of the New York, Westchester & Boston Railway are made in triangular units, conforming to the spaces between the cross bracing of the girders, and supported on longitudinal joists suspended by wiring from the steel work of the structure. After the concrete in the deck has set, the forms are struck from below by merely cutting these wires and removing the units. The joints between the flange edges of the members of the structural framing and the wooden forms are covered with strips of tarred paper. This method enables using the forms over without change and is said to result in an economy of lumber and a saving of time.

New Process of Wood Seasoning

A new process of wood seasoning, which is said to be working in France, is given in an American Consular report. The process is given as follows:—A large tank is filled with a solution containing 5 per cent. of resin, 10 per cent. of borax, with just a trace of carbonate of soda. At the bottom of the tank is a large lead-plate connected to the positive pole of a dynamo. Upon this plate the timber is stacked until the tank is full. Then another plate is superimposed upon the timber and connected with the other pole of the dynamo—the negative pole. The result is that when the current is turned on it passes through the stack of wood, from plate to plate, and in its passage it is said that the sap is driven out and the resin and borax takes its place, being deposited in the cells and interstices. After this operation is completed the timber is taken out and dried. It is then ready for use. The result, it is claimed, is highly satisfactory, for no matter how green the timber is before treatment, after treatment it is said to be completely seasoned.

Use of Quicklime in Water Purification

Purification of the Thames water by the addition of quicklime with subsequent dilution to rend it potable is suggested by Dr. A. C. Houston of the Metropolitan Water Board of London, England. Dr. Houston states that 15 lb. of quicklime, costing about 3 cents, added to 7,500 gal. raw water would kill the B coli, and inferentially but certainly the microbes of epidemic water-borne diseases, such as the typhoid bacillus. The excess of lime would then have to be neutralized with 2,500 gal. or one-third of the volume of adequately stored water to render it potable. In this way 75 per cent. of the water would be sterilized chemically and the remaining 25 per cent. sterilized by storage. Subsequent to this treatment, rapid filtration alone would be required to remove the precipitate of inert carbonate of lime and to bring the water up to a reasonable standard of chemical purity. He states that this system would be more expensive than sand filtration, but would have certain distinct advantages, notably its adaptability, its special suitability for flood waters, its capacity to render an initially foul water absolutely safe in a reasonably short space of time.

There are men who are remarkably prolific in their demonstrations that certain desirable things cannot be done. There are other men who go straight forward and do them.

There is no good thing which cannot be proved impossible. If one is to reckon with mere probabilities he will easily content himself with mediocrity.

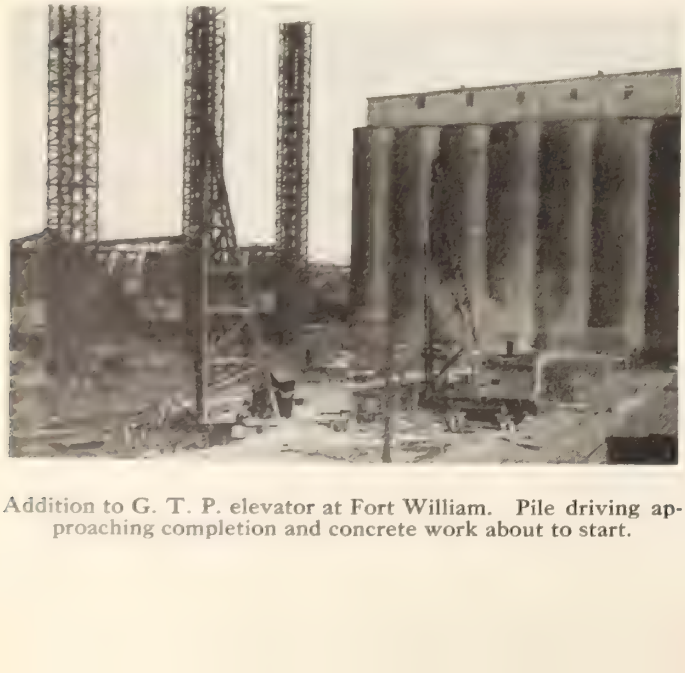
Work in progress on the addition to the C. P. R. elevator at Port McNicoll

The Operations of One Canadian Firm

Interesting Details of the More Noteworthy Work carried out by The John S. Metcalf Company, Limited, Montreal

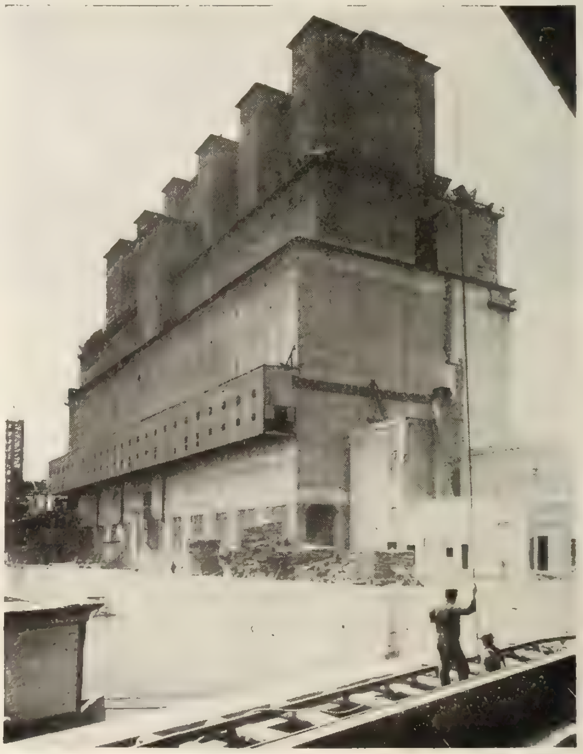
THE almost universal employment of reinforced concrete in grain elevator construction, as well as its prominence in other branches of engineering work, is well exemplified by the work at present being done by the John S. Metcalf Company, Limited, grain elevator engineers, of Montreal.

A notable development is that being made for the Canadian Pacific Railway at their new Georgian Bay Terminal, Port McNicoll. In the Fall of 1910, the John S. Metcalf Company completed a grain elevator at that point for the railroad. During and since the construction of the elevator they have also built one freight shed, 700 feet long; one flour shed, 700 feet long; an eating house to accommodate 350 freight porters; two sleeping houses for the same force; customs house; carpenter shop; water tank, pump-house and complete water system for locomotive and drinking supply, and for fire purposes; 7,000 lineal feet of wharves, in general with wood substructure and concrete superstructure.



Addition to G. T. P. elevator at Fort William. Pile driving approaching completion and concrete work about to start.

The elevator is of 2,000,000 bushels capacity, with reinforced concrete bins, two travelling marine towers, each lifting 20,000 bushels of grain per hour from boats, and a car loading house to load 250 cars per day. An addition to the storage capacity, now being made, will consist of reinforced concrete bins holding 2,000,000 bushels. This will make the total capacity of the elevator 4,000,000 bushels, or considerably larger than that of any elevator east of Fort William in either Canada or the United States. The plant is



Montreal Harbour Commissioners' Elevator No. 2 approaching completion

Richelieu River bridge—Building caisson for pivot pier.

Double walled caisson for rest pier, Richelieu River bridge.

also designed for future extension as traffic requirements warrant.

Foundation work under way is shown in one of the accompanying photographs. Gravel is screened and washed at the site of the work, the conveyors for carrying the gravel from the screening plant to the two sets of mixer bins appearing in the foreground. At the left may be seen the present elevator, and in the distance the freight shed and other buildings belonging to the new terminal.

At West Fort William, Ont., another storage addition to an immense plant only recently constructed is under way. The great reinforced concrete elevator of the Grand Trunk Pacific Railway, of 3,250,000 bushels storage capacity and exceptional handling capacity, has been in operation at that point for less than two years. The John S. Metcalf Company, who were the consulting engineers for the railroad in connection with the present elevator, and who laid out the grain-handling portion of the entire terminal, with an ultimate storage capacity of 40,000,000 bushels, are now building 2,500,000 bushels in reinforced concrete storage bins, to bring the total capacity of the elevator up to 5,750,000 bushels—a great plant, but only a part of the capacity which will be required by the time the railroad has been in operation over the grain prairies for a very few years.

The structure will rest on 7,500 piles, about forty-five feet long, and will contain 116 bins, 66 of them 23 ft. 6 in. in diameter and 90 feet deep, with 50 interspace bins.

In Montreal an elevator of 1,700,000 bushels capacity is just opening for business. This is the reinforced concrete plant for the Harbor Commissioners of Montreal, and is known as Elevator No. 2. It is undoubtedly the most complete and efficient elevator ever constructed for rapid unloading of cars and delivery to ocean vessels. The entire building, including bins and superstructure above bins, is of reinforced concrete. Not only has the use of reinforced concrete been carried further in the cupola construction than has ever before been done in grain elevator work, but the design and construction of the concrete columns, girders, floors and curtain walls would be notable when compared with reinforced concrete work in any other branch of the engineering profession. The elevator is electrically operated throughout, can unload 250 cars per day, and can, when its accessories are completed, unload 20,000 bushels an hour from each of two lake or canal vessels simultaneously and deliver grain to nineteen ocean steamer berths,—to six of these simultaneously if desired, and at the rate of 15,000 bushels to each, hourly, for 10 hours. A storage extension to the elevator, of 850,000 bushels capacity, is already under way. This will make the total capacity of the elevator 2,600,000 bushels. The Metcalf Company are acting as constructing engineers for the Harbor Commissioners, who are doing the work with their own forces.

Back Cove bridge Shoe for caisson.

In Montreal, also, the company has under construction a 300,000-bushel storage and operating elevator for the new Dominion Flour Mills Company.

Outside of grain elevator work, the Metcalf people have under construction important work for the Grand Trunk Railway at Ottawa. This includes all of the concrete work in connection with the train shed at the new Central Station, comprising foundations, roofs, smoke ducts, platforms and conduits; 425 feet of concrete retaining wall alongside the Rideau Canal; and some roadway and cut stone work at the entrance to the Chateau Laurier.

They are also building the substructures for the renewal of two bridges for the Grand Trunk Railway—one across the Richelieu River near Lacolle Junction, Quebec, and the other across Back Cove, Portland, Maine. In both cases open caissons are being used. These are built with two timber walls one foot apart, and the caissons are sunk by filling the interstice with concrete. The sinking is accomplished with the aid of divers. After reaching hard bottom, the caissons are partly filled with concrete deposited by deep-sea buckets, and are then pumped out, when the concrete filling is completed in the dry. The work at Portland consists of two rest piers for a new swing span. Hard bottom is from 50 to 70 feet below base of rail. The work on the Richelieu comprises an enlargement of the present pivot pier, new rest piers for the swing span, twelve piers for fixed spans, and additions to the present protection crib work. Hard bottom is at varying depths, and where near enough to the surface, single walled caissons will be used.

Progress and Opportunity at Vancouver

Many Great Projects Attracting Universal Attention—Unprecedented Development in Every Branch of Constructional Enterprise

Office of the Contract Record,
Vancouver, June 5, 1912.

JUDGING from the recent announcement by the Dominion Government there is every possibility that an early commencement will be made on the extensive dock and harbor scheme at Vancouver. A thorough survey of Burrard Inlet and the North Arm of the Fraser River will be undertaken immediately, and as soon as a suitable site can be decided upon, it is understood that construction on a dock will be commenced as a step towards further developments. Until the question of harbor control has been settled the plans will not be made public.

Matters affecting other constructional developments have been brought to a successful conclusion, and already there are unmistakable signs of a busy summer ahead. Great activity characterizes the operations of the various companies in British Columbia and the work is being pushed vigorously. According to the report of the chief engineer in charge of the C.N.R. construction in this province, large numbers of day laborers have returned to work, thus making it possible for construction to be resumed without any serious delay, and relieving what at first promised to be a serious condition in the labor market. Vancouver is well maintaining its own in a building sense, occupying third place in the list of Canadian cities for the first four months of the year.

Engineering Work at Point Grey

Almost $650,000 has been spent in roads and sewers in the municipality of Point Grey this year. Following is the statement of the engineering work up to date: Cleaning, grubbing, and contour grading, 6.5 miles, $29,000; grubbing roads, 10.1 miles, $17,000; grading, 11 miles, $69,000; construction of box drains, $9,000; macadamizing 12 miles, $100,000; road planking, $3,700; wooden and cement sidewalks, $5,800; bitulithic paving two miles, $50,500; thirteen miles of sewers, $358,000; total, $642,000.

British Columbia's Irrigation Projects

The development of the irrigated areas of British Columbia eastern fruit valleys is now beginning to attract attention in the Old Country, in Eastern Canada and the United States. The large fruit and orchard development companies in the province are floating three irrigation projects in the Okanagan, Columbia and Nicola valleys that will place 23,000 acres of first-class fruit lands ready for intensive cultivation.

The work of the Kelowna Irrigation Company on a tract of 8,000 acres in the Okanagan Valley, adjoining the northwestern part of Kelowna Townsite, will be completed this season. The system of irrigation employed on this tract is comprehensive. Three concrete reservoirs, with a capacity of 4,000 feet, will receive the water from small mountain lakes. From the reservoirs, 25 miles of concrete line ditches, two miles of 30-inch pipe, three miles of steel fluming, and 35 miles of distribution pipe will convey the water over the land. The system is the first of its kind to be installed in British Columbia and will cost $350,000 to complete. The work was started in the spring of 1910 and makes available about 6,000 acres not before under irrigation.

In the Columbia Valley, to the north of Windermere Lake, work will be started this month on a tract of 9,000 acres, a system of open ditches and steel flumes being installed. The water will be procured from Sinclair Creek, and two small creeks that rise in the glacial fields of the Rockies. This tract is on the line of the Kootenay Central Railway. The water service will be built in units, and it is estimated that the entire service will not be completed before 1915.

One of the oldest ranch properties in British Columbia, the Beaver Ranch at the head of Nicola Lake, a tract of 6,000 acres, settled in 1885 by the Moore family, is also being put under irrigation. An open ditch with wooden and steel flumes will convey the water supply from the headwaters of Beaver Creek.

Waterworks Tunnel Completed

Dump cars brought their last load of rock out of the 600-foot water works tunnel up the Seymour Creek recently, and the tunnel is now ready for the big 36-inch water pipe which is to be installed during the summer. Construction on the tunnel, which is through the rock bluff in Seymour canyon, was commenced by the department last year under the supervision of Waterworks Superintendent Madison. Work was proceeded with all the winter, dump carts carrying out the rock as soon as the blasters and pickmen broke it up. The tunnel measures 7 x 8 feet, and runs through solid rock from end to end.

The water pipe is at present being delivered at the wharf at the mouth of Seymour Creek, thence being hauled to the waterworks' intake. It is designed to increase the pressure in the city system as well as to give water to Burnaby municipality.

Mr. R. S. Lea, consulting engineer, of Montreal, arrived in Vancouver recently, to confer with City Engineer Fellowes respecting several problems in connection with the Burrard Peninsula sewerage scheme. Mr. Lea will look over the work accomplished so far here, including both the actual construction and the preparation of plans by Engineer A. D. Creer, his representative on the ground.

In addition to reporting on the advisability of a separate system for the sections draining into False Creek, he will also make an examination of the situation at Clark Drive, where it is feared it may be impossible to extend a crude sewerage main to Burrard Inlet from the China Creek main. The drainage of that portion of Burnaby in the vicinity of Still Creek is to be given consideration as well.

Mr. Lea's final report will not be given at present, however, as more information has still to be secured before he can deal definitely with the sewering of the sections draining into the North Arm of the Fraser and with parts of Point Grey.

Railroad Activity

An engineering party is now in the field locating the coast section of the Pacific & Hudson Bay Railway. The location work is being done by Messrs. Cartwright, Matheson & Co., a Vancouver engineering firm, of which Mr. C. E. Cartwright is the principal. Mr. Cartwright was formerly division engineer of the C.T.R. and has had wide experience in railway work.

The company has been authorized by the Dominion Parliament to construct a line from Bella Coola, a point up the British Columbia coast several hundred miles south of Prince

Rupert, to Port Nelson on Hudson Bay. The route will be via Fort Fraser, Pine River Pass, and the Peace River district.

Bella Coola is said to possess an excellent sheltered harbor at the head of Burke Channel, about midway between Prince Rupert and Vancouver. It is 450 miles from the Peace River country. There is said to be a water grade all the way to Fraser Lake with light construction except for the section near the coast. The company has secured the usual Dominion subsidy, and is controlled by an English syndicate.

Tenders are being called for the construction of ten steel bridges along the line of the Canadian Northern Railway on the Fraser and Main Thompson rivers. The bridge plans were designed by Mr. J. A. L. Waddell, of the well known engineering firm of Waddell & Harrington, Kansas City.

The first bridge will be a 420-foot arch span across the Fraser, and directly above the C.P.R. bridge at Cisco, a few miles below Lytton. Then comes a semi-cantilever bridge across the same river at Lytton. This bridge will consist of two short spans on either bank, with a long span in the middle. It is designed so that the centre span will be independent of the other spans, the principle adopted being one which Mr. Waddell was the first to advocate.

At the mouth of the Thompson will be built a skew deck truss bridge supported on pneumatic piers. No. 5, bridge further up the main Thompson will be a simple truss span, semi-cantilevered out from the shores. Nos. 6, 7, and 8 will be deck-plate girder bridges. The next bridge will be a truss span, and may be built on barges with a lot of half-through girders. The other one will be across the Thompson River at Kamloops. It will consist of a succession of deck-girder span, all alike, with a vertical lift in the centre to permit the passage of steamboats.

These bridges will cost between $1,000,000 and $1,250,000.

Mr. J. D. Mason, of Chicago, a terminal engineering expert, has been entrusted with the task of designing plans for the proposed freight and passenger terminals for the Great Northern Railway at the east end of False Creek. The visitor is paying his second visit to Vancouver for the purpose of looking over the ground. He is accompanied by Mr. Alexander Stewart, of Seattle, assistant chief engineer of the Hill road.

The engineers have examined every side of the Creek east of Main street. Mr. Mason has expressed the opinion that the site will prove an ideal one. It is expected that the entire work of filling in the bed of the creek acquired by the Great Northern and its affiliated roads as well as the track-laying, will be finished inside of twelve months. This work will include the laying of at least twenty-five miles of tracks. The construction of the railway passenger station on the north side of the creek near Main street, will not be started until the portion that is filled in will have settled enough to justify excavation for the foundations which will be extended to a great depth.

According to the provisional design, considerable space will be reserved on the north and south sides of the creek for manufacturing industries, and private warehouses. The main filled-in portion of the south side will be devoted to a freight sorting yard, as well as long rows of tracks to handle incoming and outgoing freight trains.

Mainline passenger tracks entering the city will cut across the east end of the creek and run into the depot hugging the north side of the creek. Directly south will be trackage for handling city freight, and between these breaks will be a mammoth freight shed paralleled by roadways for vehicular traffic.

Mr. Mason has laid out many of the largest freight and passenger terminals on the continent, notably at Chicago, St. Louis, Kansas City, and St. Paul. He acts in a consulting capacity to the Great Northern, Northern Pacific, Burlington, Western Pacific and many other American railways.

Contracts

The Canadian Pacific Railway recently awarded to Culletin Bros. of Spokane, Wash., a contract for the construction of ten miles of the coast division of the E. & N. Railway on Vancouver Island. Their work will extend north from McBride Junction near Nanaimo.

Another ten-mile section from Courtenay south in the direction of Campbell River, was let to Mr. C. E. Hoard, of Victoria. Between his contract and the Culletin work there is a gap of sixty miles, the construction of which will likely be undertaken later in the year.

Extensive Improvements by the C.P.R.

Official advices from Montreal received at the offices of the C.P.R. in Vancouver, state that the board of directors of the railroad company has approved an appropriation of $1,200,000 for the proposed reconstruction of the Hotel Vancouver, and another one of $215,000 for the power plant in connection with the hotel. The latter building is now in course of erection, and its completion will be hurried in order that the old power building may be demolished before the construction of the main hotel building is started.

Preliminary work, preparatory to starting construction on the new $1,000,000 C.P.R. passenger station to be located on the site of the one now standing and also covering the vacant ground at the foot of Seymour street, Vancouver, is now under way by Messrs. Westinghouse, Church & Kerr of New York. This company has sub-let the excavation work to the M. P. Cotton Company, of Vancouver. The preliminary work involves the tearing down of the dining car supply house; the construction of another building to accommodate the distribution of the dining car supplies; the building of a derrick and the laying of several spur tracks.

As soon as the excavating is completed the work of laying foundations will begin, and the first half of the new station constructed. The offices which are now in the old structure will then be moved to the new portion, and the old station demolished. The Dominion Express Company's building is to be torn down as soon as the new building is finished.

An agreement has been practically concluded between the city of Vancouver and the C.P.R. relative to the construction of the much discussed Georgia-Harris street bridge. It is now understood that the company will secure the property at the foot of Georgia street for approach purposes, and that matters concerning the Carral street approach have also reached a satisfactory settlement. The company will undertake to construct at an early date an overhead bridge from Burrard street to the wharves, and another bridge from the end of Granville street, the former to be 60 and the latter 80 feet in width.

Personal News and Notes

Tenders for various paving contracts, construction work, water pipe and valves totalling $120,000, were allotted at a recent meeting of the Vancouver City Council.

An inspection of the route of the Pacific Great Eastern Railway between North Vancouver and Lillooet is now being made by Mr. John Callaghan, chief engineer. Several engineering parties are engaged in the location of the line between Point Atkinson near North Vancouver and Lillooet, about 150 miles distant.

Recognizing the increased cost of living at the present time on Vancouver Island, and having regard for the current standard of wage paid in private employment, the Public Works department of the Provincial government have [illegible] increase the scale of pay for road workmen on Vancouver Island to a minimum of $3 per day, the rate of [illegible] having hitherto prevailed.

Mr. [illegible] who has been connected with the engineering department of the C.P.R. at Nelson for some time, has been appointed resident engineer there in place of Mr. C. S. Moss, who was transferred recently to Kamloops. Mr. Moss will be connected with the construction department at Kamloops under Mr. F. F. Busteed.

Mr. C. C. Worsfold, assistant engineer of the public works department, for southern British Columbia, has been promoted to the position of chief district engineer in succession to the late Mr. George A. Keefer.

Mr. H. N. Merriam, C.P.R. assistant engineer at Golden, who for some time past has been in charge of the location grading and bridge work on the Kootenay Central Railway, has been transferred to Kamloops. Mr. Merriam will be succeeded at Golden by Mr. Livingstone.

Prices of Building Materials at Vancouver

Building paper, No. 1, tarred, per roll	.62½
Building paper, plain, per roll	.70
Bricks, common, per thousand	13.50
Bricks, pressed, per thousand	45.00
Cement, Portland, per bbl.	3.25
Roofing, felt, per 100 lbs.	2.35
Fire brick, per thousand	45.00
Lime, per bbl.	1.35
Sewer pipe, per foot 4-in.	.15
Plaster of Paris, per bbl.	4.25
Putty, per lb., bladders in 100-lb. cases	3.40
Hard wall plaster, per ton	15.00
Nails, wire, per keg	3.25
Nails, cut, per keg	4.25
Mixed paint, per gallon	2.50
Boiled linseed oil, gallon in barrels	1.25
Boiled linseed oil, per gallon	1.35
Hair fibre, per ton	15.00
Fire clay, per ton	15.00
Lath, No. 1 pine	2.75
B.C. cedar shingles, No. 1	2.10
B.C. cedar shingles, No. 2	2.00
Lead pipe, per lb.	.07
Dry colors: white lead, per lb.	.07
Red lead, per lb., kegs	6.50
White lead, per 100 lbs. in oil	8.50
Gasoline in bbls., per gallon	.30

An Expenditure of Fifty Millions at Montreal

At Montreal, an expenditure of $40,000,000 will be made by the railways during the next two or three years. This large outlay is being undertaken by the Canadian Northern, the Grand Trunk, and the Canadian Pacific Railways, with the Canadian Northern assuming over half of the expenditure. With the formal acceptance of the plans for the tunneling of the mountain, the Canadian Northern Railway expect to commence operations early in the spring upon the gigantic task which they have undertaken. Briefly summarized they plan to tunnel the mountain a distance of some three miles, build new terminals and a hotel in the heart of the city, and carry their tracks by means of an overhead railway down to the waterfront. In addition they are laying out a new suburban town at the back of the mountain, which they expect to serve with a new rapid transit tunnel service.

The Grand Trunk Railway expect to spend between $9,000,000 and $10,000,000 in the elevation of their tracks and in the building of a new station. The bulk of the outlay is in connection with the elevation of their tracks as these cover a distance of some four miles and traverse a thickly populated section of the city. The Canadian Pacific Railway have already commenced the expenditure of a sum of money which will exceed $5,000,000. This money is being spent in the erection of new terminal facilities at both Windsor street and Place Viger, new office buildings for the Dominion Express Company on St. James street, and certain improvements in connection with their docking and harbor facilities.

In addition to the money which is being expended by the three railroads the Government, through the Montreal Harbor Commissioners, are planning the expenditure of from $10,000,000 to $12,000,000 in the next half dozen years. For the past three years the Harbor Commissioners have been spending in the neighborhood of $2,000,000 per year, and as $18,000,000 was voted by the Government for harbor improvements, the next few years will see the expenditure of the remaining $12,000,000. This sum, added to the $40,000,000 which the railroads are expending, means that upwards of $50,000,000 will be expended in Montreal in the immediate future.

Canadian Railroad Development

The officials of the Grand Trunk are reported to have under consideration the construction of a line parelleling the London & Port Stanley Railway.

The Kaslo & Slocan Railway, a 29-mile narrow gage line extending from Kaslo into the Slocan mining district, has been purchased by the Canadian Pacific Railway and will be standardized.

The C.P.R. have commenced construction work on the Kipp-Suffield branch line, which is to be one of the important feeders for the main line, and which is talked of as being eventually the southern portion of a new C.P.R. Hudson Bay via Saskatoon.

Messrs. Carlso, Schmdall & Co., Spokane, Wash., and Messrs. Cross, Heckman & Duffy, Portland, Ore., have secured sub-contracts from L. M. Rice & Co., Seattle, Wash., on the latter's bridging and grading work for the Kettle Valley Railway, in British Columbia. The total estimate on the Rice Company's contracts amounts to about $2,000,000.

The city council of Stratford, Ont., has reached an agreement with the Stratford Railway Company, whereby the latter will at once begin construction work on its projected street railway system. The company is subsidiary to the Canadian Northern Railway, and in addition to a street railway also proposes a radial line from Stratford to Grand Bend.

Construction work is to be started at once on the St. John Valley Railroad, of which A. R. Gould, Presque Isle, Me., is President. Contracts for the work have been awarded as follows: Corbett Construction Co., from St. John, N. B., to Fredericton; Quebec Construction Co., from Fredericton to Woodstock; Kennedy & McDonald, from Woodstock to Grand Falls.

The city council of Brandon has passed a resolution directing that the city engineer order 100 tons of 70-lb. rails and 500 tons of 60-lb. rails for the proposed municipal street railway. Resolutions were also passed that the council take immediate steps to secure the services of a first-class street railway engineer to superintend the building of the municipal street railway.

One of the noteworthy building events of last week was the opening of tenders for the annex to the Montreal City Hall. The lowest bid, $649,000, was made by Messrs. Peter Lyall & Sons; the next, $678,000, by Mr. C. E. Deakin, and the highest, $725,000, by Mr. Jos. Bourque.

Building Operations Active at Calgary

Creditable Showing in Permits: Six and a Half Million Dollars' Worth in Five Months—Labor Conditions—The Supply Market

Special to the Contract Record

Calgary, June 5th, 1912.

ALTHOUGH no really large building operations have been recorded during the past three weeks, operations of a smaller scale have been active, as the building permits will indicate. For the month of May, permits to the value of $2,215,400 were issued, bringing the total for the first five months of the current year to the sum of $6,330,000—more than the total for the entire year of 1910. There has been a quiet activity in the way of small apartment houses during the past two weeks, four such buildings having been commenced, the largest to cost $55,000. Several small office blocks will be built on Eighth avenue this year.

Money is rather tight here just now, and so many owners wish to have their contractors finance their jobs that they have difficulty in getting good figures.

Important Building Work

The Provincial Government has started work on the new $185,000 court house, but there is considerable dissatisfaction at the arbitrary attitude of the authorities, and it is not improbable that steps will be taken by the City Planning Commission to endeavor to have work stopped until some conclusion is arrived at in regard to the proposed Civic Centre. Compared to the really imposing Land Titles Building, alongside, the proposed court house will be very crude and undignified, and it would be nothing worse than gross negligence on the part of the city to allow the work to proceed unnoticed. Contracts for the remaining schools, to the amount of $345,300, were let last week, the two fourteen-room schools going to Doyle & Thomas and T. R. Yeager, for over $124,000 each. This makes a total of close to $700,000 in contracts for new schools let in the past two months. All of these schools are modern in that they are of solid construction, although it is to be hoped that the School Board will soon take the lead in introducing all steel trim and sashes.

The F. C. Lowes Company are about to start on a scheme for improving certain of their properties in the city by hydraulicing and landscaping. A hydraulic giant will be used to cut down Mission Hill, the earth being sluiced over to improve another property of the same concern. This will be the first improvement of property before being placed on the market, and will undoubtedly lead to more of the same sort of improving. Properties could be greatly enhanced in value, and the city beautified, if more of the soft sandhills were washed down into the bottoms. It is intended, too, that some 55,000 cubic yards of earth will be removed, entailing an expenditure of some $20,000.

Interest in the arrival of the C.N.R. and G.T.P. into Calgary has waned, although the C.N.R. has assured the authorities that they will enter the city by September 1st. Some announcement regarding the contractor for the G.T.P. station may be expected in the next two weeks. This will be but the beginning of extensive constructions in that part of the city. Already a $250,000 hotel is in the hands of a local architect, for construction opposite the depot.

An American Record

Records are being smashed in the work of bringing natural gas into the city. The Concoran Company broke all records for America when one of the ditching machines excavated 4,203 feet in ten hours. Each of the two companies has three gasoline ditching machines, operating with gangs of 35 men each, and they are approaching each other at the rate of four and a half miles a day. The City Council will be asked to pass another by-law for the expenditure of $200,000 for the extension of the electric light plant and system, as the present funds will be expended in a few weeks.

Labor Conditions and Current Wages

The present indications are that there will be trouble throughout Alberta and Saskatchewan with the Bricklayers' and Masons' Union, over wage scales. The Union have declared a strike in Lethbridge and are threatening to carry the fight all through the two provinces. They are asking for 75c, and as agreed by the Provincial Association of Builders' Exchanges, Lethbridge will not grant more than 70c. In Edmonton there is an agreement between the Union and individual contractors for 70c, to run for two years, and here in Calgary there is a similar agreement for 67½c, which has yet another year to run. So far, no one anticipates trouble in Calgary or Edmonton, but there is just a chance that the International will attempt to tie up these two places. Just now there are a large number of bricklayers idle in Calgary, so that it will require a great deal of pressure to get any sympathy from them. No agreement has yet been reached with the Carpenters' Union regarding a new scale, the contractors holding out for the renewal of the existing agreement, which provides for 50c an hour. A new agreement has just been signed with the Painters' Union, to run for two years, granting the rate of 50c per hour. Wages for other trades will remain as heretofore for another year at least. The following gives the current rate for various classes of skilled labor in Calgary: plasterers 70c; plumbers 60c; electricians 50c; tinsmiths 55c; lathers $3.00 per 1000; stone-masons 65c.

Cement Scarce—General Quotations

There is a great scarcity of cement at present and at least one firm in Edmonton has sent to the United States for a supply. Cement can be had in Calgary at $3.15 per barrel gross, or $2.70 per barrel net, the greater part being furnished by the Canada Cement Company. Good sand can be had for $1.50 per cubic yard; gravel suitable for reinforced concrete for $1.75 per cubic yard; reinforcing steel, in square twisted rods, can be had for 3¼c a pound. Terra cotta partition tiles from the Medicine Hat kilns run as follows: 4 in. x 12 in. x 12 in., 8½c apiece; 8 in. x 12 in. x 16 in., 17¾c apiece. Structural steel can be delivered here for 4½c to 5½c, depending of course on the working required. Common bricks can be had for prices running from $10.50 to $13.50 a thousand. Pressed brick and face brick have a long range in prices, depending on the quality desired. [illegible] seems to be a good price on a No. 1 pressed brick. W. W. H.

Another reduction in the price of cement is announced by the Canada Cement Company. The cut is 10 cents a barrel and is the second within six months. This reduction applies to all points west of the Lakes. The previous reduction of ten cents a barrel was made last November, so that the total drop in the last six months is twenty cents a barrel west of the Lakes and ten cents east.

Personal Mention

Mr. Russell Ellis has been appointed assistant city engineer of Regina.

Mr. S. D. [illegible] of Toronto, has been appointed superintendent of the municipal railway system of Regina.

The Winnipeg Joint Terminals Board have appointed Mr. J. A. Glasford of the C.P.R. as terminal superintendent.

Mr. Allan Purvis has been appointed manager of the interurban lines of the British Columbia Electric Railway, Limited, Vancouver, B.C.

Mr. W. H. Elson has been appointed superintendent of two of the interurban divisions of the British Columbia Electric Railway, Limited, Vancouver, B.C.

Mr. E. O. Fuce, town engineer of Galt, Ont., has resigned his position and will shortly go to Calgary where he will carry on a partnership practice with Mr. Walter Scott.

Mr. E. P. Charleston, who is associated with Mr. M. Connolly, the public works contractor who is carrying out the construction of the new Government wharves at West St. John, N.B., arrived in the city last week.

Mr. T. C. Collins, who has been assistant superintendent of the Smith's Falls division of the C.P.R., has been promoted to the position of superintendent of the Lake Superior division, with headquarters at Port Arthur. Mr. Joseph A. Tobin, of Smith's Falls, has been promoted to the position of superintendent of construction at Montreal.

News has been received from Prince Rupert of the sudden death at that place of Mr. Matthew Dow, the well known Pacific Coast contractor. Mr. Dow was the head of the company that had secured the contract for the preliminary work on the Grand Trunk Pacific's big dry dock and ship building plant and intended to make his future home in the Transcontinental terminus. During his career Mr. Dow was connected with many important construction works, but will chiefly be remembered by his building of the Grand Trunk Pacific docks at Vancouver, Victoria and Seattle.

Mr. J. D. Mason, the well known terminal engineer expert of Chicago, paid a visit to Vancouver last week in company with Mr. Alexander Stewart, of Seattle, assistant chief engineer of the Hill Road. The object of the visit was an examination in connection with the proposed Great Northern improvements. Mr. Mason has laid out many of the largest freight and passenger terminals on the continent, notably at Chicago, St. Louis, Kansas City and St. Paul. He acts in a consulting capacity to the Great Northern Pacific, Burlington, Western Pacific and many other American railways.

On May 31, Mr. J. H. Lauer, who has resigned the secretaryship of the Montreal Builders' Exchange to become secretary and manager of the Marconi Wireless Telegraph Company of Canada, was entertained at dinner, at the Engineers' Club, by the directors of the Builders' Exchange. Mr. James Ballantyne presided, and in presenting Mr. Lauer with a cabinet of silver, alluded to the good work of Mr. Lauer by which the Exchange had been put on a sound financial basis and had also been brought to its present flourishing condition with a membership of over 400. Mr. Lauer had shown excellent executive ability and sound business judgment. In response, Mr. Lauer thanked the directors of the Exchange for their kindness in making the presentation. It was with sincere regret that he was leaving the Exchange and he would always be a willing helper in the work of the Association. Mr. Lauer reviewed the history of the Exchange. Messrs. F. Pauze, A. Bremner, J. R. Meadowcroft, W. E. Potter, E. W. Sayer, T. A. Morrison, G. A. Barwick and R. L. Werry paid tribute to Mr. Lauer's work.

Messrs. Waddell & Harrington

A concern which is entitled to rank as Canadian, but whose operations are international in scope and whose headquarters are located at Kansas City, in the State of Missouri, is the firm of Messrs. Waddell & Harrington, the well known consulting engineers.

Messrs. Waddell & Harrington are best known in Canada by reason of the important bridge work that they have designed and built in Vancouver during recent years, and descriptions of which have been published in this journal from time to time.

The firm's connection with the Canadian field, however, does not exist solely by virtue of the important undertakings with which it has been identified in this country. The senior member, Dr. Waddell, is a native of Port Hope, Ont., where he was born on January 15, 1854, and his father was the late Robert Needham Waddell, for twenty years High Sheriff of Northumberland and Durham Counties. Mr. Harrington, though a native of the United States, has had an extended connection with the Canadian field.

Dr. Waddell received his early education at Trinity College School, Port Hope, proceeding later to the Rensselaer Polytechnic Institute, Troy, N.Y., from which he graduated in 1875 with the degree of C.E., and afterwards to McGill University from which in 1882, he obtained the degrees of B.A.Sc., Ma.E. and (in 1904) D.Sc. In 1904 the Missouri State University conferred upon him the degree of L.L.D. and the University of Nebraska made him a Doctor of Engineering in 1911.

Dr. Waddell

At various times in his career he has been honored by recognition from persons of high rank. In 1888 the Emperor of Japan made him a Knight Commander of the Order of the Rising Sun, while he was also decorated by the Grand Duchess Olga of Russia (sister of the Czar) with the First Class Order of the Societe de Bienfaissance for his services as principal Engineer of the Trans-Alaska-Siberian Railway.

Dr. Waddell began his professional career in 1875 as a draftsman in the Marine Department at Ottawa. In the two following years he was engaged in engineering field work for the C.P.R.; from 1878 to 1880 he was Assistant

Professor of Rational and Technical Mechanics at the Rensselaer Polytechnic Institute; in 1881 and the year following he was Chief Engineer for Messrs. Raymond & Campbell, bridge builders, of Council Bluffs, Iowa. From 1882 to 1886 he was Professor of Civil Engineering in the Imperial University of Japan. He established in private practice at Kansas City in 1887 and from that year until 1889 practised alone. From 1900 to 1906 the firm was Waddell & Hedrick. The present partnership was formed in January, 1907.

To attempt to give anything like a complete record of Dr. Waddell's achievements would fill a book. It will suffice to mention one or two of the Canadian projects with which he has been connected. He had charge of railway work and the construction of a highway bridge over the Fraser River at New Westminster, B.C. As chief engineer for the Alberta and Great Waterways Railway he was successfully locating the line when the action of the Alberta Government killed the project. For the first half of this line he obtained a far straighter line with much less vertical variation and at much less cost than anticipated, while for the remaining half of the line, although surveys had been made, equally favorable results were in prospect. Dr. Waddell's most noteworthy work in this country, however, is the trio of bridges across False Creek at Vancouver, namely, the Granville Street, the Cambie Street and the Westminster Avenue bridges. A few years ago Dr. Waddell was retained by the International Nickel Company, New York City, to make an extensive investigation as to the suitability of nickel steel for bridge building. Every conceivable kind of practical test was made and the investigation cost something like $50,000. After submitting his report Dr. Waddell wrote a paper descriptive of his experiments, which was published in the Proceedings of the American Society of Civil Engineers and for which he was awarded the Norman medal for the year. As a result of Dr. Waddell's investigations, nickel steel has been used in at least three long span bridges, of which one is no less than the great Quebec Bridge, while the other two are the Manhattan Bridge, New York City, and the Free Bridge, St. Louis, Mo.

Mr. J. L. Harrington

Dr. Waddell is the author of many important technical works which it would take too long to enumerate, but it is interesting to note that there is now in preparation an elaborate treatise on Bridge Engineering, written conjointly with Mr. Harrington. Dr. Waddell is a member of the Canadian and American Societies of Civil Engineers and of perhaps a score of other scientific and engineering bodies.

Mr. J. L. Harrington

Mr. John Lyle Harrington was born at Lawrence, Kansas, December 7, 1868. He matriculated at the University of Kansas in September, 1891, and later received the degrees of Bachelor of Arts, Bachelor of Science, and Civil Engineer.

The summers of 1893 and 1894 and also a later period were spent in Dr. Waddell's office, upon the design of bridges and elevated railways. He then went east to acquire a detailed knowledge of bridge and machine shop work and spent five months at the works of The Elmira Bridge Company, of Elmira, N.Y., and afterwards, eleven months in Philadelphia at the Pencoyd Iron Works.

From July, 1897, to January, 1898, Mr. Harrington was engaged at the Keystone Works of the Carnegie Steel Company, designing and supervising the detailing of the Port Perry Bridge over the Monongahela River. In January, 1898, he went to Johnstown, Pa., and designed and supervised the construction of the bridge and structural shops of the Cambria Steel Company, a plant costing about a third of a million dollars. His next connection was with the Bucyrus Company, manufacturers of steam shovels and dredges, as assistant chief engineer and assistant superintendent, a position which he gave up to supervise the detailing and manufacture of the latter half of the Northwestern Elevated Railroad of Chicago. This work was done in the shops of the Elmira Bridge Company, of Elmira, N.Y., and the Union Bridge Company, of Athens, Pa. When this work was substantially completed, he joined the staff of the Berlin Iron Bridge Company, where he was engaged for a year upon the design of bridges, buildings, and manufacturing plants of all kinds. The next year was spent in charge of bridge design for the Baltimore and Ohio Railroad Company. From November, 1901, until January, 1905, Mr. Harrington was with the C. W. Hunt Company and during 1905 and 1906 was Chief Engineer with the Locomotive and Machine Company of Montreal, the Canadian branch of the American Locomotive Company. He joined Dr. Waddell, his first employer, in practice on January 1, 1907.

Mr. Harrington has written a paper for the Canadian Society of Civil Engineers describing the wharf cranes of the Pennsylvania Railroad Company and has lectured at several universities, including McGill. In 1906 he received from McGill University the ad eundem gradum degree of Bachelor of Science and in 1908 the degree of Master of Science. He was elected to membership in the American Society of Mechanical Engineers in 1903; in the American Society of Civil Engineers in 1904; in the Canadian Society of Civil Engineers in 1905; in the Institution of Civil Engineers, London, in 1906, and in the Association of Railway Engineers of Maintenance of Way in 1908.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following enquiries. Readers of the Contract Record may obtain the names of enquirers by writing to the Department of Trade and Commerce, Ottawa.

586. **Drills, Pumps, &c.**—A Scottish firm manufacturing [illegible] drills, diaphragm pumps, [illegible] pumps and [illegible] desires to get into touch with Canadian buyers.

587. **Hot water boilers and radiators.**—A Yorkshire firm manufacturing hot water boilers and radiators is open to correspond with Canadian buyers.

588. **Building materials.**—A Danish correspondent asks to be placed in touch with Canadian manufacturers of building materials open to [illegible] with Denmark.

Construction News and Notes

The [illegible] Engineering Company, Limited, Vancouver, B.C., capitalized at $50,000, has obtained a charter.

The expenditure of $640,000 upon sewerage extensions at East Toronto has been decided upon by the civic works committee of the Toronto city council.

The union carpenters of Ottawa, numbering over two hundred, went on strike last week for a minimum wage of 35 cents an hour and recognition of the union.

A newly organized Hamilton concern is the Ritchie Cut Stone Company, incorporated with a capital of $40,000. Messrs. G. W. and George Ritchie are on the directorate.

Building operations at Edmonton have been seriously delayed by shortage of cement, which amounts to almost a famine. According to the local press one firm of dealers has 12,000 barrels on order and not a bag on hand.

The Courtenay Construction Company, Limited, is a new Montreal company organized with a capital of $300,000 to carry on business as engineers and contractors. The incorporators are Messrs. W. S. Johnson, Hugh Wylie and G. R. Wilson, all of Montreal.

The award of contracts for the construction of the Welland Canal will not be made until late in the fall. The delay is attributed by the Government to the magnitude of the work and the necessity for further statistical and detailed information concerning the undertaking.

Montreal is making up for lost time in the matter of building permits. Last month the total was 601, with a total value of $2,602,308. The comparison is with 589 permits and $1,703,203 in the corresponding month last year—an increase in value of $899,105.

An expenditure of $5,000,000 upon the improvement of the Ashbridge's Bay district is contemplated by the Toronto Harbor Commission. It is stated that negotiations are already well advanced with a number of large manufacturing concerns with a view to their locating in this district.

Messrs. Burns & Company, of Nelson, B.C., are putting in the foundations for the new court house at Vernon, B.C., for which they secured the contract last fall at $174,000. The new building will be two storeys high and will be constructed of red granite. The architect is Mr. Hooper, of Victoria.

The city of Fort William, Ont., is making excellent progress in building this year. The building permits for the month of May represented an expenditure of $283,578, compared with $116,375 for May, 1911. The permits for the five months of 1912 are valued at $1,511,353, as against $529,685 for the corresponding period of 1911.

Regina is experiencing a period of unequalled progress. An American syndicate has purchased property and will commence the erection of a factory to be used for the manufacture of overalls. A new Roman Catholic church, which will cost $200,000, is to be erected. The Methodists are raising $100,000 for church extension, and $75,000 will be spent on new hospital buildings.

Winnipeg is $2,000,000 ahead of 1911, as far as building permits are concerned. The total for the first five months of the year passed the $8,000,000 mark, as compared with $6,165,000 for the corresponding period of 1911. There is exceptional activity in the erection of apartment houses and dwellings and it is expected that the aggregate for the year will be more than $20,000,000.

The B. C. Electric Railway Company have awarded to C. C. Moore & Company, of Seattle and San Francisco, a contract for the construction of a steam auxiliary plant on Vancouver Island, which will involve the expenditure of $400,000. The new plant will be located along the Saanich Interurban line near Todd Inlet. The equipment, in addition to a complete steam generating plant, will consist of two Allis-Chalmers turbo-generators, each having a capacity of 2,000 kilowatts, the entire production giving the plant an output equivalent to 6,000 horsepower. The B. C. Electric Railway Company had already purchased five steam turbo-generators aggregating over 18,000 h.p., from Messrs. Allis-Chalmers-Bullock, Limited.

Substantial evidence of the renewed growth and development of St. John, N.B., continue to come to hand. At the present time the building operations in that city are of a very extensive character, indicating that St. John is on the eve of great expansion. A number of new industrial buildings are either under construction or contract, while an unusually large number of dwellings are under way. The largest piece of work this season will be the new drill hall, which will be 230 by 180 feet in dimensions. The exterior of this building will be of Montreal pressed brick with Sackville freestone trimmings. The floor construction will be particularly heavy and there are several other points which make the building of special interest. Further details will be given in this journal as the work progresses.

The Canadian Society of Civil Engineers, Montreal. whose premises on Dorchester street have been purchased by the Canadian Northern Railway, will have their new home at 176 Mansfield street. A private house, built of cut stone, and consisting of three storeys, has been purchased and will be altered to suit the needs of the society and to give the required office room. At the rear, on a lot 50 ft. square, there will be erected an auditorium, library, &c., while in the basement there will be storage accommodation. The addition will be two storeys, the lecture hall being on the second floor. The whole building is to be made fireproof. The estimated cost of the alterations and additions is $35,000. Messrs. Reid, MacGregor & Reid, who have the general contract, have commenced the excavation for the addition. Messrs. Nobbs & Hyde, of Montreal, are the ar-

The Smith Marble & Construction Co., Ltd., 145 Van Horne avenue, Toronto, have a number of valuable contracts in hand. Among the various buildings for which they are carrying out the marble work may be mentioned the Chateau Laurier and the Gill Building at Ottawa, the Gillette Safety Razor Company's building and the Central Y.M.C.A. at Montreal, and the new Custom House at Quebec. They are also doing the marble and tile work for the Herald Building and the Vineberg Building at Montreal. The company's superintendent is Mr. Thos. Allan, who reports some difficulty in transportation, especially of ceramic tiles from American points of shipment. There have recently been considerable delays on the American roads. The lines handled by the company are principally Missisquoi and Italian marbles, slate, ceramic floor tile, red quarry tile and white glazed wall tile. About 65 men are employed on the company's various contracts.

Shale Products, Limited, is a company recently incorporated to manufacture brick from red Medina shale at Inglewood, Ont. The company has secured 220 acres of land, mostly shale, which will be brought to a site between the G.T.R. and C.P.R. by an aerial tramway. The outfit was supplied by the C. W. Raymond Company, Dayton, O., and consists of three dry pans, a 999 special machine with the necessary equipment of elevators, screens, cutters, etc., a 12-track dryer, and an 18-chambered Raymond producer gas fired continuous kiln with a daily capacity of 70,000. The power plant consists of a water power on the Credit River situated less than a mile from the plant where a hydro-electric plant is being installed by Chas. Barber & Sons, Meaford, and which will transmit power to the several motors of the plant. Face brick will be the principal product but the machinery is also arranged to take care of common building, hollow block and other shale products. The provisional officers are Mr. T. H. Graham, president; Mr. R. Scott, vice-president, and Mr. J. M. Scott, secretary-treasurer, all of Inglewood, Ont.

Publications Received

"Concrete Costs;" by Frederick W. Taylor and Sanford E. Thompson; tables and recommendations for estimating the time and cost of labor operations in concrete construction and for introducing economical methods of management; John Wiley & Sons, New York; cloth $5 net. This book is designed to meet the requirements of architects, engineers and contractors and to assist them in the preparation of accurate estimates in the cost of concrete work. It is also intended to help contractors, superintendents and foremen in the more economical planning of their work and to assist in the introduction of the principles of scientific management in the building trades. The scope of the book is comprehensive and the various fields have been covered with exceptional thoroughness. The tables given for use in the preparation of form designs and of estimates will be found of great practical value, while the suggestions bearing upon the practical introduction of systematic methods into construction operations will be found applicable in part at least to the business of every contractor. The opening chapters of the book are devoted to approximate costs of concrete work. Labor costs in general are discussed in 4 and 5, which also consider practical ways of organizing construction work along scientific management lines. The apportioning of concrete is taken up in chapter 6; quantities of materials in chapter 7; cost of materials in chapter 8; labor costs in chapters 9-13; form construction in chapters 14-16 (this section is intended as an aid to the design and building of forms in the cheapest and best manner and is illustrated by 35 original details). The greater part of the remainder of the volume is devoted to tables for use in the preparation of form designs and estimates. These tables will consist in estimating the cost of materials as well as labor and the values are given in such a way that they can be readily taken off for estimates. A valuable and practical feature worthy of mention will be found in chapter 23, which contains an outline for making up estimates on building construction, including an example showing the methods of using the tables of volumes and the tables of times and costs in estimating.

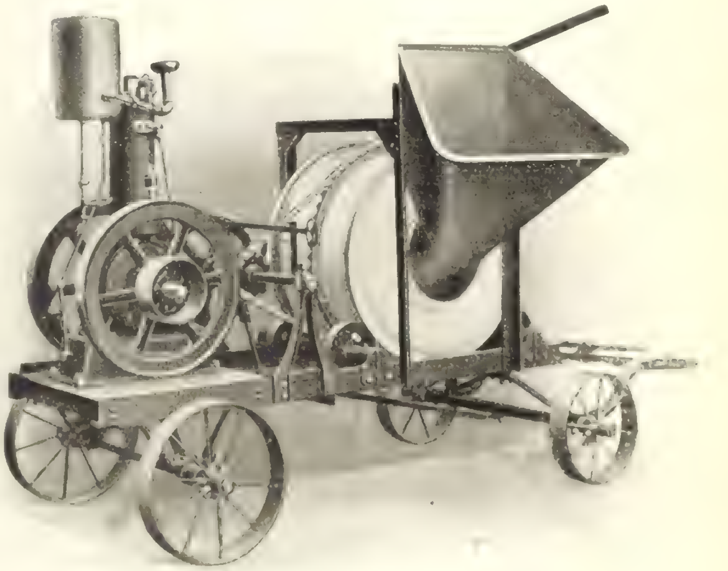
A pamphlet received from the Canada Foundry Co., Ltd., describes the McKiernan-Terry Pile Hammers, which are specially designed and built for driving heavy steel or wood sheet piling, concrete and wooden piles. The manufacturers claim that these hammers, compared with others of the same size and weight, will do more work with less power and require fewer repairs. Complete specifications are given in the pamphlet, which also contains illustrations of practical interest.

Two publications received from the American Enamelled Brick & Tile Company, 1182 Broadway, New York City, are particularly informative as to the possibilities and successful uses of enamelled brick for exterior and interior use. One of these is a catalogue of standard colors, sizes and shapes of the company's products, while the other is a collection of photographs taken of a few of the representative mills, power houses and pumping stations in which "American" enamelled brick has been used extensively. These catalogues may be obtained upon application.

From the Standard Pump & Engine Company, of Cleveland, Ohio, we have received a copy of the company's catalogue No. 12. This publication is devoted to a complete description of Standard pumping engines and Standard water supply systems, showing designs adapted to shallow wells, cisterns, lakes or rivers, and others adapted to pump from deep wells, operating with gas or gasoline engines, electric motor or hand power. The company believe that they have solved the problem of water supply and they invite full enquiry as to their installations. The catalogue will be mailed upon request.

A New Concrete Mixer

A new concrete mixer has been placed on the market by the Chain Belt Company to meet the demand for a machine of small capacity, that can be easily moved from place to place with one horse. It is particularly well adapted for the use of contractors who have occasion to do small jobs of sidewalk laying, and for use in the country in building silos, barn floors, etc. The mixer is called the No. 00 and has the capacity of 4½ cubic feet of loose material or 3½ cubic feet of mixed materials per batch. It is furnished with gasoline power, being provided with a three horse power water cooled engine. This machine can also be rigged up with an electric motor. The Drum, like those of all Chain Belt Mixers, is made entirely of a special mixture of semi-steel, and is cast in two sections. The mixing is accomplished by means of ¼-in. steel mixing blades and malleable iron buckets in the interior of the drum. On this machine, as with other Chain Belt Mixers, gears are conspicuous by their absence, as the drum is driven by steel roller Chain Belt. The roller track surfaces of the drum and the rollers on which it rests are made of chilled semi-steel and there is the least possible opportunity for the moving parts to wear out. These features should commend it to contractors who are in need of a mixer of this capacity.



Chain Belt Company's New OO Concrete Mixer

Messrs. T. Cannon & Son, Limited, 75 Brock avenue, Toronto, are building a $100,000 residence at Winnipeg for Mr. Davidson. The construction is of Ohio and Bedford limestone and the work is in charge of Mr. Alfred Cannon. At Toronto, the company are building brick and steel and reinforced concrete book vaults for the Bank of Commerce, on Atlantic avenue, and brick stores at 310 and 312 Yonge street. The company report a shortage of stone masons at Winnipeg.

Building Operations at Brandon

The King George School at Brandon, Man., was erected last season by the Brandon Construction Company, Limited. The dimensions of this building are 75 ft. by 75 ft. The accommodation provided is eight class rooms and an assembly hall. The building is constructed of reinforced concrete by the Khan system and is fireproof throughout. The exterior of the school is built of red brick with cut stone trimmings. The entrance hall is finished in marble with terrazzo floor and the interior is trimmed in fir, with oak doors. The contract price was in the neighborhood of $45,000. Ground was broken in April, 1911, and the building was finished and in use by September 1st.

Another interesting piece of work that has just been completed by the Brandon Construction Company is the Canadian Pacific Railway depot at Brandon, Man., which cost about $60,000. The dimensions of the main building are 50 x 90 feet, with two wings, 27 x 32 feet. The main building is three storeys and the wings two. The exterior is constructed of Bedford limestone and white brick. The interior of the general waiting room and also the women's waiting room is finished in quarter cut oak panelling around the walls. There are terrazzo floors with marble trimmings. The ceilings are panelled with heavy plaster cornice around the beams. The walls, lavatories and smoking rooms are of enamelled brick and the floors terrazzo. The remainder of the building is finished in fir and painted.

The Asylum Power House is another contract completed recently by this company at a cost of $50,000. This work was commenced in August last and the building was finished early in January, 1912. Steam is supplied to the main building by three 125 h.p. boilers, built by the Clark, Bell & Hall Construction Co. The exterior of the power house is of red brick with cut stone trimmings, metal sash, heavy galvanized iron cornice and metal roof. The roof is supported on steel trusses the full width of the building, giving a clear ceiling of thirty feet.

Of other noteworthy work carried out by the Brandon Construction Company, mention may be made of an addition to the Alexandria School, repairs to the Central School, extensive improvements to the McDonald Block and an addition to the Western Canada Flour Mills.

King George School, Brandon, Man., erected by The Brandon Construction Company

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Decreasing the width of a highway bridge to reduce vibration has been partially carried out in the case of the Calvert street bridge in Washington, D.C. Excessive vibration had been caused by traffic on the sidewalks, which are supported on cantilever brackets, and to reduce this the railing at the side of the bridge was moved in 5 feet with the intention of doing likewise with the south railing.

Protection of concrete against freezing was accomplished in the case of a large reservoir at Virginia, Minn., by covering the exposed portion with a layer of clay, then a layer of cinders and above that a second layer of clay, making a total thickness of 18 in. The reservoir, which was built for the Virginia Electric Power & Water Company, was 45 ft. in diameter and 21 ft. high, and was partly above and partly below the ground. When the covering was removed in the spring, the tank showed no sign of injury by frost, in spite of the severe winter.

The manufacture of building stone from blast furnace slag, states the Chemical Trades Journal, is an industry of considerable importance in Germany. The process is not patented, and is very simple in details. The slag is granulated by the addition of hot water, and after being thoroughly mixed with the required amount of lime, is allowed to stand for an hour before being put through the press. After being pressed the stones are stacked in the open air for about three weeks, according to the weather, and are then ready for use.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Amherst, N.S.
Sewerage. Tenders received by town clerk, W. F. Donkin, at whose office plans may be seen.

Glen Norman, Tp. of Lancaster, Ont.
Drains. Tenders received by Clerk A. J. MacDonald, N. Lancaster, until June 15th from whom plans may be obtained.

Montreal West, Que.
Macadam road, Cromer street. Specifications at office of engineer, R. S. Lea, 405 Dorchester W., Montreal. Tenders received by sec.-treas., Montreal West.

Niagara Falls, Ont.
Water main—2 miles, 12-in. Chairman, R. P. Slater. Engineer, Mr. J. C. Gardner. Tenders received by A. Collins, Supt., City Water Commission.

Brick pavement. Mayor, C. C. Cole. Clerk, W. J. Seymour. Tenders received by Engineer J. C. Gardner; plans may be seen at his office.

Regina, Sask.
Reservoir. Plans for construction of Torhill reinforced concrete circular reservoir obtained from R. O. Wynne Roberts, M.I.C.E., Engineer Regina. Tenders close June 21st.

St. Thomas, Ont.
Sewers. Tenders received by engineer, M. H. Baker, until June 19th, for the construction of sewers, man-holes, and private connections. Plans at engineer's office.

Tisdale, Sask.
Storm water sewers. Specifications at office of Commissioners of Public Health, Regina, or Engineer W. E. Moore. Tisdale. Tenders received by latter until June 15th.

Vancouver, B.C.
Sewers and pavements. Tenders open. City Clerk, Wm. McQueen. Plans at office of City Engineer, City Hall.

Walkerville, Ont.
Paving, Cost $6,500. A by-law for the re-surfacing pavements with asphalt block will be voted on, and if passed work will start at once. Plans at office of Engineer, Mr. Owen McKay.

Windsor, Ont.
Extension to pumping station to cost $6,000, Sandwich street. Secretary, W. A. Hanrahan. Architects, Jacques & Co. 30 x 65, brick and concrete construction, concrete engine and pump beds, prepared roofing. Plans in preparation.

CONTRACTS AWARDED

Exeter, Ont.
Waterworks system. Engineer, F. W. Farncomb, London. Sewer pipe—Hamilton & Toronto Sewer Pipe Co., Toronto, Ont. Tile—J. H. Howard, Exeter. Iron work—Canada Foundry Co., Toronto.

Hamilton, Ont.
Water tower to cost $4,990, Ferguson avenue. General contractor, Des Moines Mfg. Co., Des Moines, Iowa.

Ste. Therese de Blainville, Que.
Waterworks system, cost $75,000, for the Aqueduct Company of Blainville, Blainville, Que. Engineers, Ouimet & LeSage, 15 St. Lawrence Blvd. Work being done by owners under supervision of engineers.

Windsor, Ont.
Paving and grading to cost $221,000. Engineer, M. E. Brean. General contractor, Thomas Check. 20,000 yds. at $1.04 per sq. yd.

Railroads, Bridges and Wharves

Boswell, B.C.
Pile Bent Wharf. Plans from Dept. of Public Works, Ottawa. G. A. Keefer, District Engineer, New Westminster, B. C., and the Postmaster, Victoria, B.C. Tenders received by R. C. Desrochers, Sec. Dept. of Public Works, Ottawa, until July 2.

Chicoutimi, Que.
Two light houses on bank of River Saguenay. Tenders received until July 2 by A. Johnston, Dept. of Marine & Fisheries, Ottawa. Plans at his office and from postmaster at Tadousac, Chicoutimi and Roberval.

Carr's Brook, Colchester County, N.S.
Breakwater wharf, for Dominion Government. Plans from the Dept. of Public Works, Ottawa; H. A. Russell, District Engineer, Antagonish, N.S., and the Postmaster, Carr's Brook, N.S. Tenders received by R. C. Desrochers, Sec. Dept. of Public Works, until June 27.

Township of Finch, Ont.
Concrete box culvert and bridge over Payne River between lots 18 and 19, con. 2. Tenders will be received by Clerk until June 12th. Plans at offices of Engineers Magwood & Stidwell, Cornwall. Clerk, D. B. Cameron.

Halifax, N.S.
Car shed for Halifax Electric Tram Co., Ltd. General manager, Jas. W. Crosby. Architect, H. E. Gates, Telephone Bldg. 1-sty., reinforced concrete construction. Plans under consideration.

Meaford, Ont.
Bridge work. Tenders received by Clerk G. G. Albery until June 12th for one reinforced cement construction arch on Sykes street, and two concrete abutments for iron bridge [illegible] Plans at office of engineer, R. McDowall, Owen Sound.

Montreal, Que.
Two con. wharf sheds, Mont. harbor. Plans at office of Engr. F. W. Cowie, 57 Common street. Tenders received by David Seath, Sec., c/o Harbor Commissioners, until June 17.

Winnipeg, Man.
Bridge approaches. $7,000 has been appropriated by the Board of Control for the construction of permanent approaches to Louise Bridge.

York County, Ont.
Bridge, 1½ miles north of Aurora. Owner, Toronto & York Radial Railway. Plans being prepared and may be seen at office of engineer Frank Barber, 57 Adelaide E.

CONTRACTS AWARDED

Amaranth Township, Ont.
Simpson's Bridge, reinforced concrete. (Lots 5 and 6, con. 9). The construction under the supervision of engineer Frank Barker, 57 Adelaide street East, Toronto, who will let the work by day labor.

Bridge (Lot 17, con 4. on Owen Sound Br. C.P.R.) Engineer, Frank Barber, 57 Adelaide street E., Toronto. Steel work, Dixon Bridge Works Co., Ltd., Campbellford, Ont. Substructure, Lewis Construction Co., Toronto.

Saskatoon, Sask.
Subway to cost $12,000. City engineer, G. T. Clark. Bridge engineer, W. L. McKenzie, C.N.R. General contractor, Dominion Bridge Co., Hamilton and Toronto.

Public Buildings, Churches, Schools, etc.

Coaticook, Que.
Armory and drill hall. Brick construction. Plans being prepared and building will be erected this summer.

Dartmouth, N.S.
Sunday School, [illegible] Street Baptist Church. Chairman of Committee, W. L. Borss. Pastor, F. E. Bishop. Architect, C. R. Thorne, 16 Prince street, Halifax. Two storeys, 49 x 32, Tenders open.

Christ Church. Warden, J. L. Wilson. Rector, S. J. Woodroofe. Architect, Harris & Horton, Keith Bldg., Halifax. [illegible] Plans ready.

Hamilton, Ont.
Addition to Tabernacle to cost $6,000. (Park street). Pastor, Rev. P. W. Philpott, Mountain avenue. Architects, Mills & Hutton, Bank of Hamilton Bldg. [illegible] shortly for addition to include new gal-

[illegible] and [illegible] [illegible] 600 bench seats will be required.

Kemptville, Ont.

Public Building. Tenders received by Secretary R. C. Desrochers, until June 18. Plans at Post Office, Kemptville, Dept. of Public Works, Ottawa, and MacLean Daily Reports, Toronto.

London, Ont.

Art building to cost $3,500, for the Western Fair Association. 1-sty., 25 x 64, 13 ft. high. Architect Mr. Blackwell is preparing plans and tenders will be called shortly.

Montreal, Que.

School on Mance street, for Protestant School Commissioners. Tenders received by architect Nobbs & Hyde, 49 Beaver Hall Hill, after June 14th.

Ottawa, Ont.

Hospital and fittings to cost $10,000, Rideau street, for Controllers of Rideau Street Protestant Hospital. Mason, Alex. Garvock. Carpenter, McDermott & Tyndall. Solid brick construction. Tenders received by architect for fittings and fixtures for wards. Plans at office of J. A. Ewart, architect, Sparks Chambers.

Quebec, Que.

Fire station. Plans at office of Stavely & Stavely, 92 St. Peter street, architects, and form of tender from Engineer W. D. Baillorge. Tenders received by City Clerk, Quebec, till June 12th.

Red Deer, Alta.

Extension to Red Deer Memorial Hospital to cost $15,000. Secretary-treasurer, A. W. G. Allen. 2-sty., brick construction. Plans at office of Sharman Barnes & Gibbs, architects. Tenders open.

Extension to Municipal Offices to cost $11,000. Mayor, R. B. Welliver. Secretary-treasurer, A. T. Stephenson. 2-sty., brick veneer. Plans at office of architects Sharman Barnes & Gibbs.

Sault Ste. Marie, Ont.

Fire hall to cost $9,000, Central Park avenue. Clerk, C. J. Pim. Brick construction. Tenders open. Usual up-to-date fire fighting equipment required.

Sherbrooke, Que.

Convent to cost $3,000, St. Martin St., for J. P. Trepannier, 87 St. Gabriel St. 3-sty., 26 x 34. Excavation started.

South Maitland, Hants Co., N.S.

Extension to Municipal Home. Warden. Robt. Glass, Shubenacadie, N.S. Plans ready.

Toronto, Ont.

Moving Picture Theatre, cost $7,500, Parliament street near Wilton avenue, for J. M. Gilpin, 371a Dundas street. Architects, Redmond & Beggs, Kent Bldg. One storey, brick. Tenders open.

Tp. of Crowland, Ont.

School. Sec.-treas., F. W. Kilgour, Welland. Trustees, Geo. Hill and Leonard Mathews, Welland. Architect, C. M. Borter, Niagara Falls. Plans being prepared for a four-room building, just south of Welland.

Windsor, Ont.

Hospital Extension to cost $4,000, Ouellette street, for Hotel Drew Association. Architect, Jacques & Co. 3-sty., 18 x 17, brick construction. Plans ready.

CONTRACTS AWARDED

Campbellton, N.B.

Baptist Church to cost $15,000, Andrews street. Architect, Leslie R. Fairn, Aylesford, N.S. General contractor, J. & D. Harquail Co. Chairman of Bldg. Committee, W. P. Gray. 48 x 85, cement construction.

Church to cost $12,000, Andrews st., for Christ Church Congregation. Architect, F. Neil Brodie, St. John, N.B. General contractor, D. A. Stewart. 1-sty., 45 x 75, brick.

Halifax, N.S.

Pathological laboratory, cost $16,000, Morris street, for V. G. Hospital Commission. Architect, H. E. Gates, N. S. Telephone Bldg. General contractor, S. S. Marchall & Son, 7 Cunard street. Two storeys, brick.

Kingston, Ont.

School to cost $40,000, Johnston street, for Sisters De Notre Dame Convent. Architect, H. P. Smith, King street. Excavation and mason, H. W. Watts, Yorke street. Carpenter, Hunter & Harold. Painting and glazing, Robinson Bros., Bagot street. Roofing and iron work, 332 Barrie street. Fire escape balconies and stairs, Shipway Co., Toronto. 3-sty. and basement, 100 x 54.

Montreal, Que.

Heating system for St. Bridget's Catholic School, Maisonneuve and St. Rose street. Architects, The Canadian Domestic Engineering Company, Limited, 5 Beaver Hall Hill. General contractor, T. Lessard & Sons, 191 Craig E.

Alteration to Arts Club and Store to cost $5,000, 6 Beaver Hall Square. Architect, E. & W. S. Maxwell, 6 Beaver Hall Square. Mason and brick work, Reid, McGregor & Reid, 747 St. Catherine street. 3-sty., 52 x 26, brick and stone construction.

Theatre to cost $40,000, 393 St. Lawrence Blvd., for Mr. Doherty, 612 Sherbrooke street west. Architect, K. G. Rea, 54a Beaver Hall Hill. General contractor, John Allan, 300 Atwater ave. 3-sty., 42 x 151, iron and stone. Building to be fireproof. Old buildings being wrecked.

Addition to auditorium and offices, on Mansfield street, for Canadian Society of Civil Engineers, 413 Dorchester st. Architect, Nobbs & Hyde, 49 Beaver Hall Hill. General contractor, Reid, Macgregor & Reid, 14 Guy Block. 4-sty., 50 x 50, brick and concrete.

Minette, Man.

Infirmary Building. Architect, C. W. U. Chivers, Keewayden Bldg. General contractor, J. H. Bennett, 86 Dagmar street. 2½-sty., 61 x 46.

Ottawa, Ont.

Addition to Y.M.C.A. to cost $25,000, Laurier Avenue. Architect, J. A. Ewart, Sparks Chambers. General contractor, T. & J. & A. G. Marshall. 3-storey, 40 x 99.

Toronto, Ont.

School, cost $60,000, Pape ave. Mason, H. Lucas & Son, Havelock street, $20,592; Carpenters, Crocker & LeDrew, 185 Ossington ave., $9,840; Roofing, J. T. Flowers, 5 Denison ave., $2,048; heating, Fred Armstrong, 277 Queen street W., $8,500; plumbing and gas, Fred Armstrong, 277 Queen street west, $4,800; electric wiring, Hydro Ltd., 226 Yonge street, $737; plastering, W. J. Haddock & Son, 792 Crawford street, $1,570; painting and glass, J. Phinnemore, 445 Yonge street, $925; iron stairs, Dominion Ornamental Iron Company, c/o A. E. B. Hemmingway, 274 Crawford street, $2,957; terra cotta, R. Bennett, 274 Crawford street, $2,957. Three storeys and basement, brick and stone construction.

Duke of Connaught School. Heating and ventilating, Keith & Fitzsimmons, 111 King street west, $20.144; plumbing and gas, Purdy-Mansell, 63 Albert street, $7,339; electric wiring, Keith & Fitzsimmons, 111 King street west, $3,870.

School.— Contract for fireproofing new Clinton School with porous terra cotta awarded to Robert Bennett, Kingston road.

Westmount, Que.

Club to cost $4,500, Grey avenue, for Mount Royal Lawn Tennis Club. Architect and general contractor, Chas. J. Brown, 4263 St. Catherine street, Montreal. 2-sty., 40 x 36, brick.

Windsor, Ont.

Public school to cost $50,000. Architect, Jacques & Co. General contractor, Euclid Jacques. Excavation and mason, Thomas Bros. Painting and glazing, Lossing & Harris. Plumbing, Pennington & Brian. Heating, Windsor Hardware Co. Roofing and iron work, T. Blackburn. A. Black, Sec. Board of Education.

Residences

Bellevue, Que.

Residence to cost $12,000. for Honore Mercier. 2-sty. and basement, 48 x 36, brick and stone. Tenders received by architect, L. R. Montbriant, 230 St. Andre street, Montreal, after June 15, until June 25, 1912.

Dartmouth, N.S.

Parsonage to cost $3,800, Tulip street, for King Street Baptist Church. Pastor, F. E. Bishop. Architect, C. R. Thorne, 16 Prince street, Halifax. 2½-sty., 27 ft. 6 in. x 35 ft. 6 in. Tenders received by chairman, W. L. Borss, Acadia Loan Bldg., Halifax.

Glencoe, Ont.

Residence to cost $3,000, for W. Beechill. 1½-sty. and basement. Plans in preparation.

Mahone Bay, N.S.

Residence and office to cost $3,000, for Dr. W. N. Cochrane. Plans in preparation.

Maisonneuve, Que.

Two flats to cost $9,000, Fifth avenue, for Nap. Pepin, 8 Third avenue. Designer, E. Pepin, City Hall ave., Montreal. 3-sty., 52x52, brick veneer construction. Plans ready.

Three flats to cost $5,000, 2nd avenue, for Josephat Secotte, 178 Third avenue, Montreal. 3-sty., 85 x 50, stone construction. Work started.

Montreal, Que.

Residence to cost $4,000, Wolseley, for C. A. Jones. Strathern avenue. 2-sty., brick veneer construction. Excavation started.

Three flats to cost $5,000, Mance st., for Mrs. Nap. Loiselle, 1945 Park ave.

Architect, Chas. Bernier, St. James st., Montreal. 3-sty., 25 x 81, brick and concrete construction. Work started.

Three flats to cost $15,000, St. Hubert street, for Odilon Dugas, 1163 St. Andre street. Architect, E. P. J. Courval, 793 Henri Julien street. 3-sty., 30 x 101, brick and stone construction. Excavation started.

One pair semi-detached residences to cost $8,000, Cote Des Neiges road, for Leonard Ethier, 17 La Patrie Bldg. Architect, Prefontaine & Drouin, 55 St. Francois Xavier street. 2-sty., 30 x 60, brick veneer. Plans in preparation.

Thirteen apartments to cost $12,000, Sherbrooke and St. Chs. Borrommee, for J. H. Maher, 724 Transportation Bldg., General contractor. 4-sty., 55 x 115, brick, concrete foundation. Tenders open for electric fixtures, fire escapes and hardwood floors.

Five flats to cost $18,000, Stadacona street, for P. J. Champayne, City Hall. Architect, E. P. Courval, 793 Henri Julien street. 3-sty., 48 x 90, brick construction. Plans prepared.

Three flats to cost $9,500 on St. Hubert street, for J. L. Guerin, 1364 St. Hubert street. Architect, E. P. J. Courval, 793 Henri Julien street. 3-sty., 50 x 89, brick and stone. Excavation started.

Boarding house to cost $22,000, for H. Ganthier, c/o Alphonse Piche, 52 Victoria Sq. 5-sty., 50 x 100, brick and concrete. Tenders open.

Residence to cost $8,000, Durocher street, for J. W. D'Arcy, 7 Thornhill avenue, Westmount. Architect, Wright & Son, 204 St. James street, Mtl. General contractor. H. Hand, 609 Belmont avenue is calling for tenders for trades.

Residence to cost $12,000, Drummond street, for Mrs. E. H. Carter, 128 Bishop street. Architect, Wright & Son, 204 St. James street. General contractor, J. H. Hand, 609 Belmont avenue, Westmount. 3-sty., 52 x 35, brick and stone construction. Tenders received by general contractor for electric wiring and roofing.

New Hamburg, Ont.

Residence to cost $3,000, Waterloo st., for Alex. Hahn. 1½-sty., brick construction. Plans ready.

Ottawa, Ont.

Two residences to cost $10,000, Frank street, for A. M. Powers, 373 Nelson st. 85 x 33 and 25 x 20, brick construction. Plans prepared.

Seven residences to cost $14,000, Waverley street, for A. M. Powers, 373 Nelson street. 123 x 33, brick construction. Plans prepared.

Dwellings to cost $3,000, Paving ave., for Richard Herbert, 251 Lyon street. 20 x 36, brick veneer construction. Plans prepared shortly.

Residence to cost $4,000, Marlborough street, for K. Cohen, 140 Nelson street. 3-sty., 32 x 55, double brick veneer. Plans ready.

Residence to cost $6,000, Powell ave., for W. S. Odell, 90 Somerset street. 26 x 36, brick veneer construction. Plans considered.

Residence to cost $10,000, Frank street, for A. M. Power, 373 Nelson street 85 x 33, and 25 x 70, brick construction. Plans in preparation.

Residence to cost $14,000, Waverley street, for A. M. Power, 373 Nelson st. 123 x 33, and 25 x 20, brick construction. Plans considered.

Residence, cost $6,000, Powell ave., for W. S. Odell, 90 Somerset street, 26 x 36, brick veneer. Plans ready.

Toronto, Ont.

Residence, cost $5,000, St. Andrews Gardens, near Glen road, for Omar Hoover, 136 Geoffrey street, builder. Architect, F. A. Flemming, 2 Law street. 2½ storeys, brick and stone. Tenders received by owner.

Residence, $6,000, Palmerston Blvd., near College street, for A. Nelson, 346 Palmerston Blvd. 2½ storeys, brick and stone. Tenders open.

Residence, cost $3,200, Clara ave. near Quebec ave., for Wm. J. Sanderson, 45 Pacific ave., architect and builder. Two storeys, brick construction. Tenders open.

Residence, cost $8,000, Avenue road and Foxbar road, for Frank Babcock, 294 Indian road. Architect. D. E. Smith, 77 Victoria street. One storey and attic, 29 x 50, brick. Plans in preparation.

Residence, cost $5,000, High Park ave. near Bloor, for C. S. Clark, Montreal. Architects, Page & Warrington, Confederation Life Bldg. Two storeys, brick construction. Tenders to be called.

Two detached residences, cost $8,000, Eleanor ave. near Oakville ave., for Arthur Edmonds, 157 Symington ave., bldr. Architect, R. H. Smith, 290 Perth ave. 2½ storeys, brick. Owner does mason work but is open for tenders for all other trades.

Four residences and store, cost $10,000, Sackville street, for A. Zessroit, 123 Maria street, architect and builder. Brick construction. Plans ready.

Residence, cost $3,500, 173 Hilton ave. for Geo. C. Aman, 503 Dupont street, architect and builder. Two storeys, brick. Tenders open.

Residence, cost $12,000, Russell Hill road, for Hugh Dunfield, 102 Yonge St. Architects, Thompson & Belfry, 43 Victoria street. Mason, Moore & Stewart. 2½ storeys, brick and stone. Other contracts not yet awarded.

Residence, cost $10,000, for F. B. Francis, 482 Wardlaw ave. Architects, Ross & McFarlane, Union Bank Bldg. 2½ storeys, 28 x 40. Tenders open.

Residence to cost $3,000, Oak Mount Blvd., for T. A. Patterson, c/o Architect. Architect. Bovell & Molesworth, 449 Yonge street. 2½-sty., brick. Tenders open.

Residence to cost $5,000, for Rea-Lynch & Co., 84 Spencer avenue. Architect. Designing & Draughting Co., 36 Toronto street. 2½-sty., brick and [illegible]

Windsor, Ont.

[illegible] for T. Coussineau. 2-sty., brick construction. Plans ready.

Winnipeg, Man.

[illegible] E. Briggs Investment Co., 101 McArthur [illegible] open.

Two residences to cost $6,000, Dominion street, for A. J. Anderson. 2½-sty., frame. Plans ready.

Residence to cost $1,400, Arlington st. Owner and architect, W. B. Adam, 216 Edmonton street, Winnipeg. 2½-sty., 22 x 29½. Plans ready. Tenders called.

Residence to cost $4,500, Jessie ave., for J. F. Schriebner. 2-sty., 26 x 34, brick. Plans ready.

Residence to cost $7,000, Dorchester street, for V. V. College. Architect, Hooper & Hooper, McIntyre Block. 2½-sty., brick. Plans ready.

Three res., $9,000, Banning st., for G. T. Johnston. 2-sty., frame. Plans ready.

CONTRACTS AWARDED

Calgary, Alta.

Residence to cost $5,000, Elbow Park. Owner and contractor, R. McFarlane, 1107 10th avenue west. 2-sty., 32 ft. 6 in. x 26.

Apartments to cost $7,000, Mount Royal. Owner and contractor, R. J. Colgrave, Northern Crown Bank. 2-sty., 36 x 62.

Residence to cost $5,000, Bow Park, for A. Poffenorth, Riverside. General contractor, H. Rudnick, 408 5th avenue E. 2-sty., 24 x 36. brick veneer.

Two residences to cost $4,000, Mount View, for P. Palfrey. 208 15th avenue, architect and contractor. 1½-sty., 20 x 34. Plans ready.

Residence to cost $6,000, Elbow Park, for H. Pollard, 118a 8th avenue west. General contractor. W. R. Bague, 415 8th avenue east. 1-sty., 38 x 40. frame and stucco.

Two residences to cost $5,000, Parkdale, for A. S. McKay. Architect, L. Dowler. General contractor, Johnston Bros., Travis Block. 2-sty., 23 x 24. brick veneer.

Residence to cost $6,000, Sunalta, for C. R. Hembury. 1716 7th street west. General contractor, Johnston Bros., McTavish Block. 2-sty., 28 x 38, brick veneer.

Residence to cost $4,000, Elbow Park. for E. M. Cartwright. General contractor, A. Waters, 724 3rd avenue west. 2-sty., 35 x 26.

Residence to cost $5,000, Sunalta, for T. Webster, National Hotel. General contractor, M. Bateson, 1025 10th street East. 2-sty., 30 x 40, frame construction.

Chateauguay, Que.

Residence to cost $6,000, for J. E. McComber, c/o McComber & Cummings, 373 St. Paul street. Architect, D. J. Crighton, Jacobs Bldg. General contractor, Mr. Metcalfe, Chateauguay. 2-sty., 45 x 50, brick veneer.

Lachine, Que.

[illegible] Victor Gourgeon, Montreal West, Que. General contractor, Dalbe Viau, 76 St. [illegible]

Maisonneuve, Que.

[illegible] eral contractor, Rosario Boyeur, 85 Wm. [illegible] struction.

Montreal, Que.

[illegible] cil street. Owner and general contractor, Jno. Hamelin, St. Laurent, Que. 3-sty., 50 x 60. Work started.

Two residences to cost $8,000, for Jos. Richards, 266 Dufresne street. General [illegible] W. Lefebvre, 294 Poupart st. 3-sty., 50 x 78, stone and brick.

Residence to cost $3,000 for H. T. [illegible] Pine avenue. Architect, E. & W. S. Maxwell, 6 Beaver Hall Hill. General contractor, Reid, McGregor & Reid, 747 St. Catherine west. Plumbing and heating, Hickey & Aubut, 93 Do[illegible] street. 2-sty., 26 x 60, brick and [illegible]

Alterations to residence to cost $5,000, Dorchester street, for Avilda Desaulniers, 897 St. Denis street. Architect, Alphonse Piche, 52 Victoria Sq. General contractor, L. Lanevin, 228 Park Lafontaine. 2-sty., 34 x 44, stone construction.

Residence to cost $5,000, Fourth ave. Owner and general contractor, R. E. Duval, 486 Clarke street. 2-sty., 35 x 45, stone and cement construction. Excavation started.

Residence to cost $3,000, for S. P. Champoux, 22 Cote des Neiges Rd. Designer, Beaugrand Champagne, 402 Durocher street. General contractor, Jos. Denis, 102 Belgrave avenue. 4-sty., 50 x 40, stone and brick construction.

Residence to cost $3,000. Owner and general contractor, W. H. Taylor. 2-sty., brick veneer construction.

Residence to cost $5,000, Cote St. Antoine road, for Jos. Decarie, 29 Botrel avenue. General contractor, S. Whitaker, 285 Hampton avenue. 2-sty., 25 x 56, stone and brick construction.

Three flats to cost $4,500, Delaroche street, for J. Achille Chevrier, 41 Delaroche street, Montreal. General contractor, Arsene Frenette, 212 Fabre st.. Mtl. 3-sty., 19 x 66, brick and concrete construction.

Two flats to cost $3,000, Botrel street. Owner and general contr. D. Bourbonnais, 131 Chambord street, Montreal. 2-sty., 25 x 42, brick veneer construction.

Three flats to cost $4,500, Chabot st., for Achille Robert, 70 St. James street. General contractor, Jos. Paradis, 415 Joliette street. 3-sty., 25 x 48, brick and concrete.

Semi-detached residence to cost $10,000, Clarke avenue. Owner and contractor, C. N. Blakely, 46 Aberdeen avenue, Westmount. Architect, Wright & Son, 204 St. James street. Three stys., 30 x 40, brick and concrete.

Residence to cost $5,000, 701 Molson avenue. Owner and general contractor, John Mark, 699 Molson avenue. Two sty. and attic, 45 x 48, brick.

Two residences to cost $10,000, Maplewood avenue. Owner and general contractor, J. B. Bisson, 811 Marechal ave. 2-sty., 28 x 40, stone and brick.

Addition to residence to cost $3,500, 136 Colonial avenue. Owner and general contractor, Wilensky & Co., 1221 St. Urbain street. 3-sty., 35 x 32, stone and brick.

Residence to cost $3,000, Bordeaux st. Owner and general contractor, Bartolomes Cabotto, Bordeaux street. 2-sty., 25 x 42, brick veneer construction.

Residence to cost $8,000, Wolseley. Owner and general contractor, C. A. Jones, Strathearn avenue. Brick. Work started.

Flats to cost $3,000, Chamblv street. for Jos. Beaucourt, 406 Chambly street. General contractor, Leduc, Provost, Sauve & Cie. 453 Nicolet street. 2-sty., 25 x 38, stone and brick.

Residence to cost $5,000, Christopher Columbus street. Owner and general contractor, Louis Renaud, 1690 Christopher Columbus street. 3-sty., 52 x 51, brick veneer.

Montreal West, Que.

Residence to cost $4,000, Brock, for Miss Seppell, Mt. Stephen Apartments Westmount. General contractor, W. R. Reay. 2-sty., brick veneer.

Ottawa, Ont.

Residence, cost $3,000. Owner and general contractor, Richard Herbert, 251 Lyon street. 20 x 36, brick veneer.

Residence to cost $4,000. Marlborough street. Owner and general contractor, K. Cohen, 140 Nelson avenue. 32 x 55, double brick veneer.

Residence to cost $2,500, Noel street for J. G. Leichrity. General contractor. E. Wentcliff, 247 McLeod street. 18 x 24, brick veneer construction.

Residence to cost $3,000, Flora street Owner and contractor. W. O. Byrnes, 14 Balsam. Double brick veneer construction.

Red Deer, Alta.

Residence to cost $7,500 for A. W. G. Allen. Architect, Holman & Gotch, Red Deer and Calgary. General contractor, T. S. Miller. Plumbing and heating. Smith & Gaetz. 1-sty., 58½ x 48½, brick veneer.

Residence to cost $3,500, Highland Park, for H. W. Trimble. General contractor, W. Loveland. 2-sty., 26 x 22.

Toronto, Ont.

Residence, cost $4,500, for Mrs. W. R. Gregg, 92 Forest Hill road. Architect, W. R. Gregg, 23 Jordan street. Builder, Wm. Hurse & Son. 2½ storeys, brick.

Residence, cost $25,000, Chestnut Park road, for A. J. Gough, Louisa & Yonge streets. Architect, H. Simpson, 82 King street east. Mason, Holtby Bros., 21 Robert street. Carpenter, N. J. McLeod, 341 Carlton street. Plumbing and gas, D. Glynn, 156 Arthur street. Other trades not let yet. Two storeys and attic, brick.

Apartments, cost $8,500, St. Joseph and Grenville streets, for J. H. Young, 46 Grenville street, builder. Architects, Mallory & Thather, 31 Queen street. Mason, Earl Bros., 79 Duggan avenue. Carpenter, W. T. Kincade & Co., 51 Cumberland street. Electric wiring, J. Fallon, 31 Queen street west. Plastering, W. J. Haddock & Son, 792 Crawford street. Paint and glass, Thos. W. Conlan, 680 Yonge street. Two storeys, brick and frame construction.

Residence, cost $4,000, 102 Wright ave., for J. Levoine, 171 Sorauren ave. Architect and general contractor. Excavation and masonry, J. Portaine, 702 St. Clarens ave. Carpenter, L. A. Girrared, 200 Howard road. 2½ storeys, 18 ft. 6 in. x 41 ft., brick. Foundation in.

Residence, cost $5,000, E.S. Schofield street, for L. C. Van Beaver, 63 Foxbar road. Builder. J. A. Alexander, 232 Jarvis street. 2½ storeys, brick.

One pair residences, cost $7,000, 96-98 Wright ave., for W. E. Mackay, 469 Bathurst street, architect and general contractor. Excavation and masonry, J. Timbers, 82 Annette street. Other contracts to be sub-let by owner. 2½ stys., 32 x 46, brick construction.

Residence, cost $6,000, Walmer Hill, for Mr. Grant Helliwell, 43 Rosedale Rd. Architects, Gordon & Helliwell, Confederation Life Bldg. Mason, F. W. Weale, 35 Lindsay avenue. Carpenter, Geo. T. Lea, 579 Indian road. 2½ sty., 35 x 30, brick and stone.

Residence to cost $18,000, Avenue rd., for A. L. Malone, 72 Lowther avenue. Architect, Sproatt & Rolph, 90 Yonge street. Masonry, W. Hughes, 216 Simcoe street. Roofing, Fred Williams, 524 Clinton street. Heating and electric wiring, Bennett & Wright. 72 Queen E. Plastering, Hoidge & Son, 34 Price st. Steel sash, Henry Hope & Son, 45 King street west. 2½-sty., 45 x 46, brick and stone construction.

Three residences to cost $6,900, for W. Carlyle, 320 Deleware avenue. Architect, J. H. Stanford, Bloor and Ossington. Mason, E. White, 35 D'Arcy st. Carpenter, H. Cockburn, 1017 Dufferin street. Slate roof, Geo. Sinclair, 307 Clinton street. Hot air heating not let. Plumbing and gas, W. Boxall, 78 Westmoreland avenue. Electric wiring, Cornish Bros., 318 Parliament street. Plastering, J. Willis, 292 Bathurst street. Painting, day work. 2½-sty., brick.

Residence to cost $3,500, 17 Hurndale avenue, for A. J. Williamson, Long Branch. Builder, J. B. Barker & Sons, 9 St. Enoch Sq. Architect, H. J. Baker, 204 Spadina road. 2-sty.

Residence to cost $4,000, Geoffrey st., for S. Shaver, 402 Dovercourt road. Architect and builder, J. Snowden, 9 Chapel street. 2½-sty., 22 x 34, stone and brick.

Two residences to cost $4,500, 667 Pape avenue. Builder and architect, Wm. H. Howard, 19 Englewood ave. 2-sty., brick.

Residence to cost $8,000 for R. C. Bustard, 18 Toronto street, architect and general contractor. Excavation and mason, S. Walker, 406 Dundas street. Carpenter, E. Eyre, 89 Balmoral ave. Painting and glazing, Watson & Cooper, 347 Ossington avenue. Plumbing and heating, T. G. Barrington, 934 College street. Plastering, R. J. Maxwell, 250 Delaware avenue. Wiring, C. S. Anderson & Co., 332 Montrose avenue. 3-sty., 39 x 46 ft. 8 in., brick.

Residence to cost $4,000, High Park Gardens, for Geo. Nicholson, 1218 Gerrard street. Architect and builder. 2-sty., 31 x 32. brick and stone. Owner purchases material and supervises work.

Six pair residences to cost $30,000, Marchmont road, for T. Tisdale, 350 Markham street, architect and builder. 2-sty., brick. Plans drawn.

Vancouver, B.C.

Residence. Alder street, for Harry Bettz. General contractor, P. S. Combs & Son, 160 Hastings west. 1½-sty. and basement. Tenders received by architect for minor contracts.

Winnipeg, Man.

Two residences to cost $6,000, Cathedral avenue. Owner and general contractor, A. J. Bonnette, 492 Flora avenue, Winnipeg. 2½-sty.

Westmount, Que.

Four semi-detached residences to cost $30,000, Roslyn avenue. Owner and contractor. W. H. Creed, Victoria avenue.

2-sty. and basement, 35 x 45, brick and concrete construction, concrete foundation, electric lighting, hot water heating, gravel and slate roofing, hardwood floors.

Residence to cost $25,000, Aberdeen avenue, for J. S. Norris, c/o Montreal Light, Heat & Power Co. Architect, K G. Rea, 54a Beaver Hall Hill. General contractor. D. G. Loomis, St. Patrick avenue, Cote St. Paul . 2-sty. and basement, 42 x 42, brick and concrete. Tenders received by general contractor for roofing and wiring until June 12th.

Residence to cost $15,000, Cambridge avenue, for N.S. Crocker, Stanley and St. Catherine street. Architect, Wright & Sons, 204 St. James street. Masonry and stonework, J. Morison, 207 Guy st. Carpenter, T. S. Hudson & Co., 612 Bd. of Trade. Roofing, Sibley & Huot, 77 Duke street. 2-sty., 34 x 56, brick and stone construction.

Windsor, Ont.
Residence to cost $5,300, Mory street, for A. Commartin. Architect, Jacques & Co. General contractor, Adam Jacques, Tecumseh. 2-sty., 32 x 42, brick veneer.

Business Buildings and Industrial Plants

Annapolis Royal, N.S.
Rectory to cost $3,000, for Anglican Church. Rector, Rev. H. How. Plans being prepared and tenders will be called shortly.

Coaticook, Que.
Extension to factory, Penmans, Ltd., Paris, Ont.., contemplate overhauling an old stone bldg., to be fitted up with machinery for the manufacture of knitted goods. New roofing, floors, sprinkling and ventilating apparatus, power hoists, engines and water wheels, shafting, etc. required.

Fenwick, Ont.
Gas and oil factory to cost $10,000, for The Pelham Natural Gas & Oil Co. President, B. A. Pattison. Sec., E. W. Fair. Application has been made for incorporation.

Grimsby, Ont.
Improvements to Woolverton Block for A. Bournes and G. E. Miller. General contractor, Mr. Kemp. Electrical and general new store fittings will be required.

Halifax. N.S.
Alterations to Prince George Hotel, Sackville street, for Nathaniel Doherty. Architect, Walter Busch, 60 Bedford Row, Halifax. Plans prepared and tenders will be called shortly.

Melita, Man.
Dairy. Plans being prepared and tenders called shortly. Plans in hands of Town Council.

Moncton, N.B.
Store to cost $[illegible],000, for R. F. Colpitts, 777 Main street. Tenders will be received by architect, W. C. Barnes, Wyse Bldg., Main street. 2-sty., 80 x 20.

Two stores and dwellings to cost $8,000, Marie Anne and Papineau, for J. E. Barnabe, cor. Mentana and Duluth, Mtl. Architect, E. P. J. Courval, 793 Henri Julien street. 2-sty., 50 x 50, brick construction. Plans ready.

Factory to cost $7,500, Botsford st., for Havelock Mineral Springs Co., Ltd., c/o J. A. Marven & Co., Main street. Architect. W. C. Barnes, Wyse Bldg. 2-sty., 60 x 90. Plans ready.

Offices, 88-90 St. James street, for West End Land Co., Room 42, 107 St. James street. Plans in preparation for remodelling premises into an up-to-date office building.

Niagara Falls. Ont.
Store and office building, for Salvation Army. Brigadier Adby, Hamilton Headquarters is in charge of work and is seeking a suitable site.

Toronto, Ont.
Addition to office, cost $4,000, S. E. cor. Church and Gerrard street, for Presbyterian Publications, 60 Bond St. Architect, Chas. Wagner, 15 Toronto St One storey, 60 x 110, brick. Plans ready.

Welland, Ont.
Store and flats to cost $2,900. Main st., for Jno. Thew. 2-sty., brick. Plans ready.

Windsor, Ont.
Factory, cost $10,000, McDougall St., for Hupp Motor Car Co. Manager, W. Bamford. Architects, Crane & Pennington. One storey, 110 x 50, galvanized iron construction, sheet metal roofing. Foundation in.

Offices to cost $4,000, Victoria avenue, for Dr. N. J. Amyat. Architect, Jacques & Co. Plans in preparation.

Stores and flats to cost $8,500, Wyandotte street, for F. A. Sweet. Architect, Jacques & Co. 2-sty., 34 x 70, brick. Plans in preparation.

Winnipeg, Man.
Stable to cost $27,000, for Minnipeg Electric St. Railway. Manager, W. Phillips. 2-sty. and basement, 65 x 80, to accommodate about 20 horses. Plans in preparation.

Store to cost $3,500, Poplar avenue, for J. Patterson Grocery Co. 1-sty., 110 x 22, brick construction. Plans ready.

CONTRACTS AWARDED

Calgary, Alta.
Store to cost $3,000. Balmoral street, for J. D. Wilson. General contractor, W. Keen, 1730 11th avenue west. 2-sty., 25 x 26. brick veneer.

Warehouse to cost $5,000, 10th avenue west, for Cray & Rose, Ltd., England (Mr. Stewart, Braemar Lodge, Calgary). Architect and contractor, D. Richards, 821 7th avenue west. 1-sty., 60 x 40.

Stores and rooms to cost $8,000, Mission street. for J. W. Young, 2118 4th street west. General contractor, D. Steria, 1818 18a street west. 2-sty., 36 x 54, brick veneer.

[illegible] and offices, [illegible] $[illegible] [illegible] ave., for G. Calhoun, 923 4th avenue W. Architects, [illegible] [illegible]ner. General contractor, Mr. Sheridan. [illegible] [illegible] x 72, brick.

Store, $10,000, 7th ave. east, for N. N. DeMille. General contractor, McDougall & Foster, Board of Trade Bldg. One storey, 42 x 130, hollow tile.

Factory, [illegible] $[illegible] [illegible] ave. west, for J. C. Dafoe. Architects, Laing & Smythe, Beveridge Block. General contractor, The Swanstrom Company, 323 Travis Block. Three storeys, 50 x 96-6, brick.

Stores and picture theatre to cost $10,000, for C. Newman, Rohl Block. General contractor, H. Ernest, 234 7th ave. west. One storey, 50 x 80.

Warehouse and machine shop, 11th avenue west, for Canadian West Natural Gas Co., 7th avenue E. Architect. Holman & Gotch, Calgary. General contractor, Fyshe Martin & Co., Dominion Bank Bldg. 2-sty., 96 x 40, brick.

Stores and offices to cost $8,000, 7th avenue, for T. Beveridge. Beveridge Blk. General contractor, McDougall & Foster, Board of Trade Bldg. 1-sty., 40 x 75.

Stables and stores to cost $20,000, 3rd avenue west, for Dominion Express Co., Winnipeg. Architect, Woodman & Carey, Winnipeg. General contractor, Carter Halls & Aldinger, Ltd., Calgary. 2-sty., 65 x 74.

Stores to cost $10,000, 4th street east, for J. O. E. Ltd., 1st street west. General contractor, Jones & Lyttle. 1-sty., 50 x 105, brick and tile.

Hamilton, Ont.
Additions to cost $20,000, for Traders Bank, King street west. Manager, A. B. Ord. Architect, A. W. Peene. General contractor, Geo. F. Webb, Wentworth street. 2-sty., brick, stone, steel and concrete construction.

Lachine, Que.
Store and residence to cost $4,000, Eighth avenue, for M. Rombach, 80 Notre Dame street. General contractor, Bourbonnais. 80 Notre Dame street. 2-sty., 40 x 30, brick veneer.

Montreal, Que.
Storage, cost $14,000, Dupre Lane, for National Breweries Limited, 36 Chaboillez street. Architects, Cox & Amos, 112 Mansfield street. General contractors, Church, Ross & Company, 40 Hospital street. Electric wiring, C. Lapierre, 419 Lindsay Bldg. Cold storage installation, Kent Co., Ltd., 713 Canadian Express Building. Plumbing, heating and roofing, T. Lessard & Sons, 191 Craig street east. Two storeys, 60 x 95, pressed brick construction.

Additions—manufacturing premises of John W. Peck & Co., Limited, St. Lawrence Boulevard. Contractor, D. G. Loomis & Sons. Architect, Joseph Perrault, 2106 Park avenue.

Store and residence to cost $12,000, 351 Frontenac street. Owner and general contractor, F. Charland. 1595 Ontario E. 66 x 28, brick construction.

Store to cost $20,000, Mt. Royal ave., for B. Damiens, 894 Mt. Royal avenue, general contractor. Architect, J. A. Godin, 269 Denis street. Montreal. 3-sty., 47 x 80, stone and brick. Foundation started.

Extension to store to cost $2,500, St Lawrence street, for G. M. Gravel, 129 [illegible] street west. Architect, G. A. Monette, 97 St. James street. General contractor, A. Lavellee, c/o owner. 2-sty., 40 x 50, brick. Foundation started.

Factory, Britannia street, for Allan [illegible]. General contractor, [illegible].

Continued on page 76

Tenders and For Sale Department

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work—to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

Newmarket Public School

Sealed tenders (separate or in bulk) will be received by the architect up to **the evening of June 15th**, for the erection of a six-roomed public school in the Town of Newmarket.

The building will be of stone and brick with artificial stone trimmings; flat roof, plumbing, warm air heating.

Plans and specifications may be seen at the Architect's office and also at the office of Contract Record, Toronto, on and after May 25th.

The lowest or any tender not necessarily accepted.

Dr. C. H. R. CLARK,
Chairman of Board.
O. E. TENCH, Architect,
Newmarket, Ont.
21-24

Tenders
For Steel Bridges

Sealed tenders, marked "Tenders for Steel Bridges," will be received by the undersigned up to noon on the **17th day of June, 1912**, for the supplying of material, construction and erection of three 50-feet spans and one 40-feet span steel truss bridges in the Township of Mono, between 7 and 10 miles from Orangeville.

Specifications and all necessary information may be obtained from the undersigned.

The lowest or any tender not necessarily accepted.

C. R. WHEELOCK,
Civil Engineer.
Orangeville, Ont.
June 1st, 1912.
23-24

Special Notice to Contractors

Could supply you with any quantity of RELAYING RAILS or for REINFORCING CONCRETE at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

TENDERS

NORTH BAY

Tenders will be received by the undersigned up to **June 15th, 1912**, for about 4,000 feet of Standard 4-in. Cast Iron Water Pipe, five 4-in. Valves with Valve Boxes, and three Hydrants. The lowest or any tender not necessarily accepted.

T. N. COLGAN,
Commissioner of Works,
23-24 North Bay, Ont.

CITY OF BRANTFORD

Tenders for
Concrete Sewer Pipe

Sealed tenders, addressed to Alderman Samuel Suddaby, Chairman of the Board of Works, c/o of the City Clerk, Brantford, Ontario, will be received till 12 o'clock noon on **Saturday, June 15th, 1912**, for the furnishing of about 6,000 ft. of Reinforced Concrete Sewer Pipe, varying in size from 30 inches to 45 inches.

Specifications may be seen and instructions to bidders and forms of tender obtained at the office of the City Engineer.

The lowest or any tender not necessarily accepted.

T. HARRY, JONES,
City Engineer.
City Engineer's Office,
Brantford, May 29th, 1912. 23-24

TOWN OF STEELTON
Province of Ontario

Tenders for Aqueduct and Concrete Pavements

Sealed tenders will be received by the Town Clerk until 8 p.m. on **Tuesday, June 18th, 1912**, for the construction of a reinforced concrete aqueduct, approximately 1,900 feet long, and about 13,000 square yards of concrete pavements.

Plans, profiles and specifications may be seen at the office of the Town Engineer, Town Hall, Steelton, Ontario.

A certified cheque for $1,000 shall accompany each tender.

The lowest or any tender will not necessarily be accepted.

JAS. LYONS, Esq., Mayor,
Steelton, Ont.
J. ROBINSON, Esq., Town Clerk,
W. B. REDFERN, Esq., Town Engineer.
23-24

TENDERS

NORTH BAY

Tenders will be received up to **June 15th, 1912**, for the construction of about 23,000 lineal feet of Cement Sidewalk 5 ft. wide, including filling.

Specifications will be supplied on application to the undersigned.

The lowest or any tender not necessarily accepted.

T. N. COLGAN,
Commissioner of Works,
23-24 North Bay, Ont.

Township of Lancaster

TENDERS

Sealed tenders, marked "Bridge Tenders" will be received by the undersigned clerk of the Township of Lancaster at his office, North Lancaster, Ont., until noon of the **15th day of June, 1912**, for the construction of concrete abutments for a bridge over the River Beaudeth at Glen Nevis, Con. 7, Lancaster Township, County of Glengarry.

The work comprised in this contract will include excavating for the foundation, supplying all material for constructing two abutments and wing walls, clearing the site of all surplus material, removal of old bridge, etc.

The engineer's estimate of concrete is 140 yards. Plans and specifications may be examined at the office of Mr. J. McLennan, C.E., Williamstown, Ont., and at my office. Each tender shall be accompanied by a cash deposit or accepted cheque in favor of the municipality for $150. The lowest or any tender not necessarily accepted.

ARCH'D. J. MacDONALD, Clerk.
North Lancaster, Ont., 29th May, 1912. 23-24

Township of Lancaster

TENDERS

Sealed tenders addressed to the undersigned and marked "Bridge Tenders," will be received until noon, **15th June, 1912**, for the manufacture and erection of a Warren Truss Steel Highway Bridge over the River Beaudeth at Glen Nevis, 7th Con., Township of Lancaster, Glengarry County. The site of this bridge is about 2 miles from Dalhousie Mills Station on C.P.R.

1. The bridge to consist of one span 70 feet between abutments and 73 feet over all, by 16 foot clear roadway—concrete floor.

2. The structure is to be made and erected in accordance with the plans and specifications which may be seen at the office of Mr. J. McLennan, C.E., Williamstown, or at my office, and every detail of work not provided for shall be carried out in accordance with the Ontario Government specifications for Steel Highway Bridges, 1911.

3. Payment of 50 per cent. of the contract price will be made on the work and material delivered at the bridge site and the balance on the completion and acceptance of the work by the engineer.

4. The substructure will be ready for the superstructure by 1st September, 1912.

5. The Municipal Council do not bind themselves to accept the lowest or any tender.

A. J. MacDONALD, Twp. Clerk,
23-24 North Lancaster, Ont.
May 29th, 1912.

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. Chicago, Ill.

Notice to Contractors

Sealed tenders addressed to the undersigned will be received up to 7 o'clock p.m., on **Monday, 17th of June**, for the erection of a four-room addition to building known as the King Edward School, Sault Ste. Marie, Ontario. Plans and specifications may be seen at the office of Demar & Murdock. The lowest or any tender not necessarily accepted.

J. C. RICHARDSON,
23-24 Sec.-Treas. School Board.

To Contractors

Sealed tenders, endorsed "Tenders for Dormitory," addressed to the undersigned, will be received at this Department up to noon on **Wednesday, June 19th, 1912**, for the erection of a Dormitory Building (excepting heating, plumbing and lighting) on the grounds of the Institution for Deaf and Dumb, Belleville.

Plans and specifications can be seen at this Department and at the above Institution.

An accepted bank cheque, payable to the order of the Honorable J. O. Reaume, Minister of Public Works, for five per cent. of the amount of the tender and the bona fide signatures and addresses of two sureties or the bond of a Guarantee Company, approved by this Department must accompany each tender.

The Department will not be bound to accept the lowest or any tender.

By order,
H. F. McNAUGHTEN,
Secretary
Department Public Works, Ontario.
Toronto, June 5th, 1912

Newspapers publishing this notice without authority will not be paid for it. 24-25

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope, "Tender for Paving," will be received by the undersigned up to 5 o'clock p.m. of **Monday, June 24th, 1912**, for paving the following streets:

Cumberland Street—		
Track Paving	sq. yards.	2,363
Roadway Paving	sq. yards	3,417
Curb and Gutter, straight	lin. ft.	1,980
Curb and Gutter, circular	lin. ft.	140
Algoma Street—		
Track Paving	sq. yards	684
Roadway Paving	sq. yards.	2,734
Curb and Gutter, straight	lin. ft.	1,340
Curb and Gutter, circular	lin. ft.	110

Further information as to plans, specifications, and form of tender may be obtained from the City Engineer.

A marked cheque for 10 per cent. of the estimated amount of the contract must accompany each tender.

The lowest or any tender not necessarily accepted.

J. J. HACKNEY,
[illegible]
Corporation Offices, Port Arthur,
June 3rd, 1912 24-25

For Sale

Established Electrical Contracting and Retail Supply business in rapidly growing Ontario town of 7,000. Reason for selling, owner has other business which requires his entire time. Address Box 509, Contract Record, Toronto, Ont. 23-24

TENDERS

Tenders will be received up to 8 o'clock on the evening of **June 17, 1912**, for the construction of 20,000 feet of granolithic sidewalk in the Village of Athens. Specifications may be had on application to the undersigned to whom tenders should be addressed. The lowest or any tender not necessarily accepted.

23-24 G. F. DONNELLY, Village Clerk.

Tenders for Tower Clock

Tenders addressed to the undersigned will be received by registered post only up to 12 o'clock noon on **Tuesday, July 2, 1912**, for the complete supply and installation of a tower clock in the tower of firehall No. 17, corner Queen street east and Herbert avenue, Toronto.

Copy of specifications may be seen and tender form obtained, together with all information relative thereto, at the office of the Property Department, City Hall, Toronto.

The usual conditions pertaining to tendering, as prescribed by city by-law, must be strictly complied with, and envelopes containing tenders must be plainly marked on outside as to contents.

A bond from a guarantee company, satisfactory to the Corporation, will be accepted in lieu of the personal sureties provided for in the tender form.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
City Hall, Toronto, June 7, 1912. 24

Notice to Contractors

Tenders will be received by the undersigned for the substructures and superstructures of ten (10) bridges over the Fraser, Thompson and North Thompson Rivers on that section of the Canadian Northern Pacific Railway between Port Mann and the Yellowhead Pass, Province of British Columbia.

Tenders are to include any or all portions of the construction or the delivery of metalwork only.

Detailed drawings, specifications and forms of contract may be obtained on or after June 5, 1912, at the office of the Consulting Engineers, Waddell & Harrington, White Building, Vancouver, B. C., upon the payment therefor of fifty dollars ($50). This amount will be refunded to those who bid on the work, upon the return of the bidding papers in good condition.

Total work to be completed before June 1, 1913.

Tenders to be received at the offices of the undersigned, Metropolitan Building, 837 Hastings street west, Vancouver, B.C., not later than noon of July 8, 1912, and to be enclosed in sealed envelopes marked "Tender for Bridge Construction."

The lowest or any tender not necessarily accepted.

MACKENZIE & MANN COMPANY, LTD.
24-25

Tenders for Church Building

Tenders will be received by the undersigned up to **Thursday, June 20th, 1912**, for the erection of the proposed new Anglican Church in the Village of Watford. Complete or separate tenders will be received. Plans and specifications may be seen at the Guide-Advocate office, Watford.

W. A. WYKESMITH,
Secretary Building Committee.
A. G. Brown,
W. A. Wykesmith, Wardens. 24

Township of Markham

Tenders for Concrete Bridges

Sealed tenders will be received by C. H. Stiver, Esq., Township Clerk, Unionville, up to noon on **Friday, June 21st**, for the construction of three girder bridges and one arch bridge in the Township of Markham.

For plans and specifications and other infomation apply to the Township Clerk or to G. B. Padget, Dollar, Ont., or to

BOWMAN & CONNOR,
Engineers,
24 36 Toronto Street, Toronto.

Tenders Wanted

City of St. Catharines, Ont.

The Board of Works invite tenders for the construction of Berryman Avenue Trunk Sewer, consisting of approximately:

500 lin. ft. of 3-ft. dia. concrete-segment sewer in tunnel.
1,500 lin. ft. of 18-in. tile and cast iron sewer in open cut.
2,300 lin. ft. of 15-in. tile sewer in open cut,
and relative works, manholes, chambers, etc.

Plans, profiles and specifications may be seen and form of tender obtained at subscribers' office. Tenders duly filled up and accompanied by accepted cheque for five per cent. of the amount to be lodged with J. Albert Pay, Esq., City Clerk, not later than noon on Wednesday, July 3rd.

Lowest or any tender not necessarily accepted.

R. D. BROWN, A.M. Inst. C. E.,
City Engineer.
St. Catharines, June 10, 1912. 24

CITY OF MOOSE JAW, SASKATCHEWAN

Tenders for Sewer and Water Extensions

Sealed tenders, marked "Tenders for Sewer and Water Extensions," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon on **Friday, June 21st, 1912**, for the laying of approximately [illegible] of 10-in. and 8-in. sewers and 6-in. water mains.

Plans, specifications and all information may be obtained from [illegible], City Engineer.

The lowest or any tender not necessarily accepted.

A. W. [illegible]
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, Sask., June 5, 1912 24-25

Canadian Agents Wanted

Large United States firm manufacturing port- [illegible] wants to secure reliable [illegible] in all parts of Canada. These [illegible] fitted to any wagon gear, will instantly convert them into first-class [illegible] at one-third the usual cost. Apply Box 511, Contract Record, Toronto, Ont.
24-25

CITY OF TORONTO

Main Drainage Works

Sealed tenders for the construction of Section No. 12 High Level Interceptor, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only up to noon on Tuesday, **July 2nd, 1912**. The work consists of the construction of about 2,757 lin. feet of 4-foot diameter circular brick or concrete sewer with connections.

Plans, specifications, forms of tender and other information may be obtained at the office of the Acting City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
July 2nd, 1912. 24-25

Books for Sale

A number of books of interest to engineers and contractors are offered for sale at about one-half their cost. Among them are the following:

Reinforced Concrete, 590 pages, by Albert W. Buel, C.E. Publishers, The Engineering News Publishing Co., New York.

Principles of Reinforced Concrete Construction, 320 pages, by F. E. Turneaure and E. R. Maurer. Publishers, Jno. Wiley & Sons, New York.

Treatise on Masonry Construction, 740 pages, by Ira Osborn Baker. Publishers, Jno. Wiley & Sons, New York.

Light and Heavy Timber Framing Made Easy, 395 pages, by Fred T. Hodgson. Publishers, Frederick J. Drake & Co., Chicago.

Practical Concrete Block-making, 75 pages, by Chas. Pallister. Publishers, Industrial Publication Co., New York.

Short Cuts in Carpentry, 90 pages, by Albert Fair. Publishers, Industrial Publication Co., New York.

Estimating Frame and Brick Houses, Factories and Outbuildings, 250 pages, by Fred T. Hodgson. Publishers, David Williams Company, New York.

Sanitation and Sanitary Engineering, 175 pages, by Wm. Paul Gerhard.

Structural Details or Elements of Design in Heavy Framing, 370 pages, by Henry S. Jacoby. Publishers, Jno. Wiley & Sons, New York.

Architectural Composition, 234 pages, by Jno. Beverley Robinson. Publishers, D. Van Nostrand Co., New York.

Guide to Sanitary Inspection, 230 pages, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New York.

Building Construction and Superintendence, 960 pages, by F. E. Kidder, revised by Thos. Nolan. Publisher, W. T. Comstock, New York.

The Water Supply, Sewerage and Plumbing of Modern City Buildings, by Wm. Paul Gerhard. Publishers, Jno. Wiley & Sons, New Pork.

Resistance of Materials, 650 pages, by N. de Tedasco and A. Maurel.

The above books, together with a number of others, may be seen at the office of the Contract Record, 220 King street west, Toronto. Further particulars of any book furnished on request.

CITY OF REGINA

Street Railway Materials

Sealed tenders, maked "Tenders for Street Railway Materials," will be received by the City Commissioners, Regina, Sask., up till noon, 12 o'clock, **June 24th, 1912**, for the supply and delivery, f.o.b. cas, Regina, of the following:—

(1) Street Rails and Accessories.
(2) Intersection Work.
(3) Overhead Materials.

A marked cheque for five per cent. of the bid must accompany each tender.

Lowest or any tender not necessarily accepted.

L. A. THORNTON,
City Commissioner.

TOWN OF BRAMPTON

Sealed tenders, addressed to the undersigned, will be received up to 6 p.m., **Monday, June 24th, 1912**, for the construction of the following works:—

1st—25,000 sq. ft. concrete sidewalk.
2nd—3,500 lin. ft. of 8-in. and 10-in. sewers.
3rd—2,000 sq. yds. asphalt block pavement.
1,300 sq. yds. vitrified block pavement.
9,000 sq. yds. bituminous pavement on concrete foundation.

Plans and specifications for the above work can be seen at the office of the Town Engineer.

A marked cheque, made payable to the Town Treasurer, for five per cent. of the amount of each tender, shall accompany each tender.

Separate tenders will be considered.

The lowest tender not necessarily accepted.

W. H. McFADDEN, Clerk.
W. M. TREADGOLD, Town Engineer.
Brampton, June 11, 1912.

CITY OF REGINA

Cast Iron Pipe and Specials

Sealed tenders, marked "Tenders fo Cast Iron Pipe, will be received by the City Commissioners, Regina, Sask., up till noon, 12 o'clock, **June 26th, 1912**, for the supply and delivery f.o.b. cars, Regina, of the following:—

Approximately 3,000 lin. ft. of 6-in. Cast Iron Pipe.
Approximately 1,600 lin. ft. of 8-in. Cast Iron Pipe.
Approximately 5 tons of specials.
To be delivered by July 10, 1912.
Also approximately 10,000 lin. ft. of 6-in. Cast Iron Pipe.
Approximately 3,000 lin. ft. of 16-in. Cast Iron Pipe.
Approximately 350 lin. ft. of 18-in. Cast Iron Pipe.
Approximately 1,700 lin. ft. of 24-in. Cast Iron Pipe.
Approximately 8 tons specials.
To be delivered by August 1st, 1912.

A marked cheque for five per cent. of the bid must accompany each tender.

Lowest or any tender not necessarily accepted.

(Signed) J. McD. PATTON,
24-25 Superintendent of Waterworks.

Situations Wanted

Scotch engineer experienced in structural and concrete work wants position as superintendent or inspector. Four years Canadian experience. Box 510, Contract Record, Toronto. 23-24

Wanted

A sales engineer for manufacturing concern. Apply Box 514, Contract Record, Toronto, Ont.
24

Corporation of Oshawa

Concrete Sidewalks

Tenders will be received up to noon of **Wednesday, June 19th, 1912**, for the construction of 25,000 square feet more or less, of Cement Concrete Sidewalks.

Specifications and other information may be obtained at the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

FRANK CHAPPELL, C.E.,

Tenders for Motor-Driven Combination Hose Waggons and Chemical Engines

Tenders addressed to the undersigned will be received by registered post only up to noon on **Tuesday, July 2nd, 1912**, for supplying two motor-driven combination hose waggon and chemical engines.

Specifications and forms of tender, together with the conditions governing tenders, as prescribed by city by-law, may be obtained upon application at the office of the Fire Department, Richmond Street Fire Hall, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
Toronto, June 4, 1912. 24

Business Buildings and Industrial Plants

(Continued from page 73)

Bishop street. Iron work, Dominion Bridge Co., Lachine. Que. 2-sty., 75 x 100, concrete and steel construction.

New Westminster, B.C.

Stores and rooms, cost $14,000, for G. A. Hankey, Vernon, B.C. Architects, Gardiner & Mercer. General Contractors, Miller & Jewhurst. 3 storeys.

Port Credit, Ont.

Factory, for St. Lawrence Starch Co. Contractor, J. E. Webb Co., 7-9 Fisher street, Toronto. Main building 480 x 100 ft.. 5-sty., brick stack 150 ft. high; size inside of flue 8 ft. square; brick, concrete and steel.

Saskatoon, Sask.

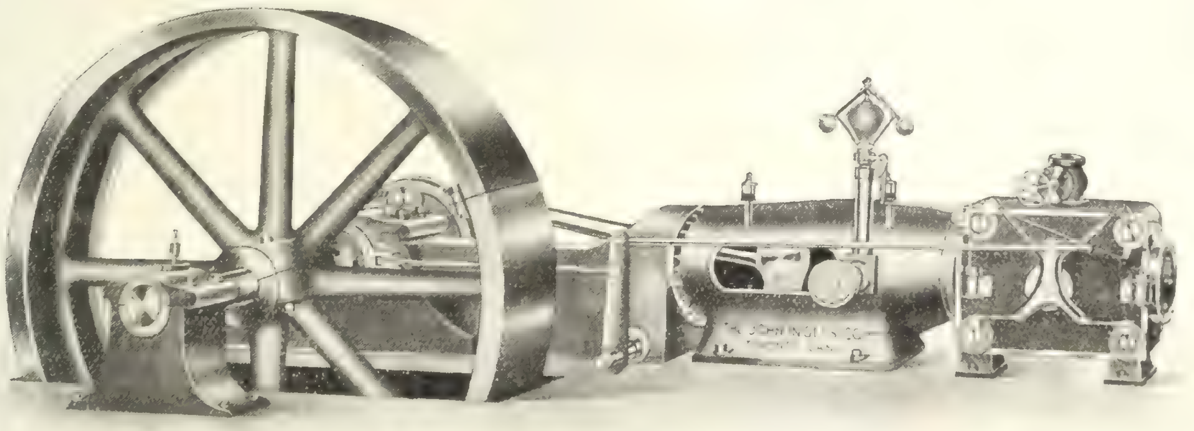
Office building, 3rd street, for S. R. Ross. Architect. Edward & W. S. Maxwell. General contractor, Smith Bros., & Wilson. Plumbing and heating, Thomson & Homer. 7-sty. and basement, brick and stone construction.

Toronto, Ont.

Three stores and billiard room, cost $12,000, McGee and Queen streets, for Mr. C. Shier. Architects, Mallory & Thather, 31 Queen west. Mason, John Cardwell, 120 Major street. Carpenter, A. E. Dunn, rear 203 Yonge street. Electric wiring, E. A. Greene & Co., 189 Church street.

Warehouse, Jefferson ave., for Ideal Bedding Co., Ltd. Architect, F. H. Herbert, 65 Adelaide street east. Masons,

INGLIS CORLISS ENGINES



JUDGED by the highest standards of economy, efficiency and small cost of upkeep, Inglis Corliss Engines have never had to acknowledge a superior.

Inglis Corliss Engines are always reliable and have been proved for 35 years. Their steady, positive action has won the confidence of engineers all over Canada.

We also manufacture marine engines, steam and motor driven pumps, penstocks, stand-pipes, presses, tanks, hydraulic machinery, blast furnaces, air compressors, vacuum pumps, etc.

Ask for our representative to call

THE JOHN INGLIS COMPANY LIMITED

Engineers and Boiler Makers **Strachan Ave., TORONTO**

Witchall & Son, 163 Havelock street. Carpenter, A. & A. Grant, 518 Dupont street. Structural steel, Dominion Bridge Co., Confederation Life Bldg. Steel frames, Steel & Radiation, 78 Adelaide street. Five storeys, brick construction.

Warehouse to cost $26,000, for Winnett & Wellinger, Sorauren avenue. Architect, Symons & Rae, 15 Toronto st. Mason, Dancy & Son, 220 Howland ave. Roofing, A. B. Ormsby, Queen and George streets. Carpenter, Arthur Bet[illegible], [illegible] Fenwick avenue. Heating, Wm. [illegible], [illegible] College street. Plumbing and gas, Fiddes & Hogarth, 122 King E. Painting and glazing, W. J. Bolus, 206 Victoria street. Structural steel, Reid & Brown, 63 Esplanade E. Galvanized iron, A. B. Ormsby Ltd., cor. Queen and George streets. 4-sty. and basement, brick.

Storage building to cost $10,000, for H. B. Johnston, River & Wilton avenue. Architect, J. F. Brown, Board of Trade. Mason, C. W. Wood & Sons, 611 Manning avenue. Carpenter, S. Hogg, 242 Markham street. 2-sty., brick construction, tar and gravel roofing. Other trades not let yet.

Warehouse to cost $40,000, Adelaide street west, for Boeckh Estate. Architects, Burke, Horwood & White, 28 Toronto street. Builder, T. Cannon & Son, 75 Brock avenue. Mason, W. Hughes, 216 Simcoe street. Carpenter, Munro & Son, 76 Spadina avenue. Roofing, H. Williams & Co., 23 Toronto st. Heating, plumbing and gas, Purdy Mansell, 63 Albert street. Electric wiring, Bennett & Wright, 72 Queen street E. Plastering, Duckworth Bros., 119 Huron street. Painting and glazing, F. G. Roberts & Co., 256 George street. Elevator, Otis-Fensom Elevator Co., Traders Bank Bldg. Structural steel, McGregor & McIntyre, 73 Pearl street. 4-sty.

Store to cost $25,000, 310 Yonge st., for Mrs. A. Hill, 21 Admiral road. Architect, Burke, Horwood & White, 28 Toronto street. General contractor, T. Cannon & Son, 75 Brock avenue. Carpenter, T. J. Sproule, 54 Shanley street. Heating, plumbing and gas, Tor. Furnace & Crematory Co. Ltd., 72 Queen street E. Painting and glass, F. G. Roberts, 256 George street. Structural steel, Can. Foundry Co., cor. King and Simcoe streets. 4-sty., brick and steel construction.

Vancouver, B.C.
Garage and store to cost $5,500, Rockland avenue, for The Wood Motor Co. Architect and general contractor, Parfitt Bros. 1-sty., frame and galvanized iron.

Winnipeg, Man.
Stores and apartments, Langside and Preston. Architect, Edgar Prain, 313 Fort street. General contractor, Daykin Scott Construction Co., 253 Princess So. Two storeys and pasement, 25-6 x 50, brick.

Stores, Ellice and Furby, for N. T. MacMillan, c/o Ross, MacMillan & Knight, Ltd. General contractor, William Moxam. One storey, 110 x 50, brick and stone.

Stores, Smith street, for Dr. R. Burke. General contractor, W. R. Wells, Winnipeg. One storey, brick.

Six stores to cost $10,000, Main and St. Marys streets, for Lennon & Shea. Architect, W. Grayston, 572 Ross ave. General contractor, B. Ritchie, 233 Vaughan street. 1-sty., brick.

Windsor, Ont.
Stores and flats to cost $7,000, Wyandotte street, for Mr. Heatherington, Wheatley, Ont. Architect, Osterhout & Little. General contractor, Peter Osterhout, Windsor. Excavation and mason, and iron work, Thompson Bros. 2-sty., 30 x 50, brick.

Alterations to store to cost $7,500, on Sandwich street, for Baum & Brody. Architect, Jacques & Co., Windsor. Mason, R. Parker. Carpenter, E. Jacques. Painting and glazing, J. Lanskner. Plbg., Windsor Hardware Co. Heating, J. L. Heureux. 3-sty., 25 x 108.

Power Plants, Electricity and Telephones

Burford, Ont.
The Electric Light Co. have purchased a large new dynamo and will make important additions to the system.

Quebec, Que.
Gas conduits. The Public Utilities Commission has ordered the Quebec Ry. Light, Heat & Power Co. to repair 63 miles.

Toronto, Ont.
Siemens Bros., 10 Adelaide E., have received orders for 150 kw. 475 r.p.m. compound wound, direct current 3 wire generator for Winnipeg General Hospital; for a 400 kw., 550/600 volt, 450 r.p.m. direct current, compound wound generator with commutation poles from the city of Regina and a 500 kw., 450 r.p.m. motor generator set, motor is of synchronous type having output of 750 B.h.p. on a 3-phase, 60-cycle, 2200-volt system. Generator has output of 500 kw., 550/600 volt for city of Port Arthur.

Vernon, B.C.
Power house. Engineer, Mather, Yuill & Co., Ltd., Vancouver, B.C. Plans at City Hall, or Consulting Engineers office. Tenders received by Clerk D. G. Tate.

Winnipeg, Man.
Transformers. Contemplated, three 1,000 kw. transformers for reducing 60,000 volts to 2,200 volts at terminal station. The three 500 kw. transformers at present in use to be removed to substation on King street. Engineer, J. G. Glassco, 54 King street.

Business Notes

Grand Falls, N.B.
Sawmill of Jas. Burgess & Sons destroyed by fire; to be rebuilt and new machinery installed.

Hamilton, Ont.
Brick yards, on Macklin street, owned by Ollman Bros. destroyed by fire. Loss $10,000. Work of rebuilding to be commenced at once. New brick-making machinery required.

Quebec, Que.
Chateau Frontenac Hotel damaged by fire. Loss $25,000.

Sorel, Que.
The Sorel Steel Works and the St. Lawrence Saw & Steel Works were completely destroyed by fire.

Welland, Ont.
Flour mill $5000 owned by R. Cooper known as Brown's Mill destroyed by fire. Loss $5,000. To be rebuilt.

Miscellaneous

Montreal, Que.
Lumber. Owner, "G" c/o Builders Exchange, Eastern Tps. Bank Building, Montreal, requires 300,000 ft. of 3-in. sound square edge beech f.o.b. Montreal delivery to begin in 3 months and finish in 6 months. Tenders called.

Regina, Sask.
Supplies. Plans with Engineer R. O. Wynne Roberts, M.I.C.E., for 350 tons of reinforced steel bars, 145 tons of R.I. joists, 6,000 bbls. of Portland cement and castings for the reservoir. Tenders close June 21st.

New Companies

The Ontario Agency Company, Ltd., has been incorporated with a capital of $40,000 to carry on a general land and building business with head offce at Toronto. The provisional directors are W. D. Gregory, H. F. Gooderham, of Toronto.

The Humbervale Lands Limited has been incorporated with a capital of $500,000, to carry on business as a general land and building company, with head office at Toronto. The provisional directors are Robt. Gowans, C. D. Magee and S. G. Crowell, all of Toronto.

The Dominion Screw Company, Limited, has been incorporated with a capital of $300,000, to carry on business as a land and building company with head office at Hamilton. The provisional directors are R. G. Laidlaw, E. Hodson and C. J. Myles, all of Hamilton, Ont.

Keelesdale Land Company, Limited, has been incorporated with a capital of $100,000, to carry on a general land and building company with head office at Toronto. The provisional directors are Harry Riley, J. B. Moon and G. W. Morley, all of Toronto.

Waterloo Estates Limited, has been incorporated with a capital of $40,000, to carry on a general land and building business with head office at Toronto. The provisional directors are Leo. A. Mitchell, M. E. Robins and H. R. Moses, all of Toronto.

Victoria Construction Company, Limited, has been incorporated with a capital of $40,000, to construct, maintain and operate power houses, plants and equipment for the development, generation and transmission of water, steam, electricity or other power, with head office at Toronto. The provisional directors are G. G. Ruel, A. J. Reid and R. G. M. Temple, all of Toronto.

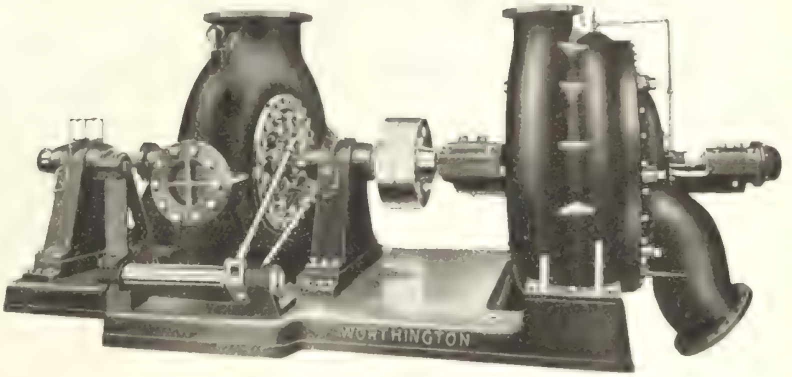
The W. E. Pearce Company, Limited, has been incorporated with a capital of $20,000, to carry on business as builders and contractors with head office at Gananoque. The provisional directors are W. E. Pearce of Township of Pittsburg, and J. A. Jackson of Gananoque, Ont.

The Ritchie Cut Stone Company, Limited, has been incorporated with a capital of $40,000, to carry on business as contractors and dealers in building materials, with head office at Hamilton. The provisional directors are G. W. Ritchie, C. P. Hardy and Geo. Ritchie, of Hamilton.

PAPER MILL PUMPS

Centrifugal Pumps specially designed for carrying stock, boiler feed, fire service and general use.

The pump here shown has a capacity of 4,000 gals. against 340 ft. driven by a 600 h.p. water wheel at 1,000 r. p. m.



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THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO., LIMITED

Sales Offices: Montreal, Cobalt, Toronto, Winnipeg, Calgary, Vancouver

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WATER PURIFICATION

¶ This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
305 KENT BUILDING, TORONTO

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Lime, Stone, Cement, Sewer Pipe, Fire Brick, Weeping Tile, Mortar Colors, Plaster, &c.

Toronto Agents for

OWEN SOUND CRUSHED STONE

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Head Office, 1327 Bloor Street West

Phones, June. 828,829.

Branch Yards, 53 Merton Street

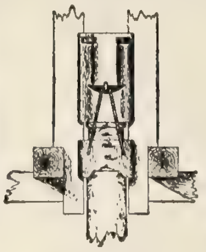
Phone, North 4751 G.T.R. Belt Line
Night and Sunday calls, Phone, Parkdale, 2198.

PILE DRIVERS

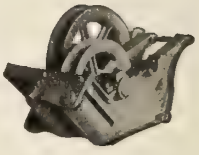
VULCAN IRON WORKS CHICAGO ILL., U.S.A

Station D

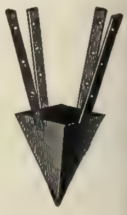
Steam Hammer

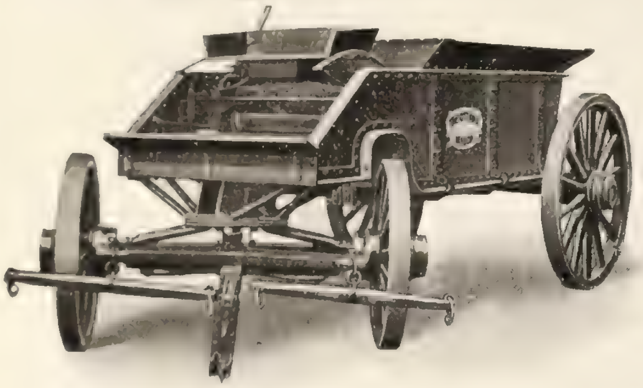


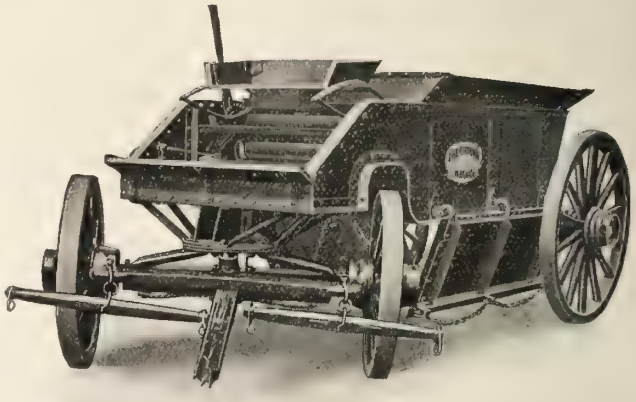
Casgrain Pile Cap



Perfect Head Block







Ottawa Steel Dump Waggons

are the latest development in Dump Waggons, and the original cost is no higher than inferior makes.

Strong, light, everlasting, first cost is last cost.

Let us demonstrate the superiority of this Dump Waggon over all others.

The General Supply Company of Canada, Ltd.

Ottawa **Toronto** **Winnipeg**

For Sale for Immediate Delivery

- 1—Buckeye Trench Machine, cuts trench 15 in. x 5½ ft.
- 1—Buckeye Trench Machine, cuts trench 28 in. x 7½ ft.
- 1—Buckeye Trench Machine, cuts trench 36 in. x 12 ft.
- 1—Parson Trench Machine, cuts trench 24 in. to 60 in. x 20 ft.
- 1—Municipal Trench Machine, cuts trench 24 in. to 72 in. x 20 ft.
- 1—26 ton Little Giant Traction Shovel.
- 1—45 ton Vulcan Track Shovel.
- 1—No. 0 Thew Full Circle Shovel.
- 1—No. 5 Austin Crusher with Corrugated Head and Back Gear.
- 1—No. 5 Gates Crusher Style "K" with smooth head in excellent condition.
- 1—No. 5 McCully with new head and new shaft.
- 1—Set of 16 in. x 36 in. McCully Rolls.

CREAM CITY EQUIPMENT COMPANY

600 Majestic Building, Milwaukee, Wis., U. S. A.

REVERSIBLE

10 H. P. BUILDERS' ENGINE

Drum Will Lift on a Single Line **2,600 Lbs.**

On a Double Line will Lift **5,200 Lbs.**

160 Feet per Minute
80 Feet per Minute

Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

Weight with Boiler, 4,000 lbs; without Boiler, 2,400 lbs. Light enough to be moved about easily.

Length over all, 5 ft. Width over all, 5 ft. 10 in. This Engine is also made non-reversing, at a reduced price and weight. Made with One Drum or Two Drums.

Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

Marsh & Henthorn, Limited
Belleville, Ont.
Makers of Hoisting Machinery
Sales Agents: MUSSENS Limited, Montreal

"HALITUS"
Ventilators

Highly Efficient

Inexpensive

Sizes 6 to 96 inch Diameter Neck Meas't.

The Flanged **"Halitus"** just as shipped, all ready to nail on the roof.

Catalogue and price list on request.

The Metallic Roofing Co. LIMITED
Manufacturers
TORONTO, ONT. WINNIPEG, MAN.
(C 42)

Rhodes, Curry Co., Limited
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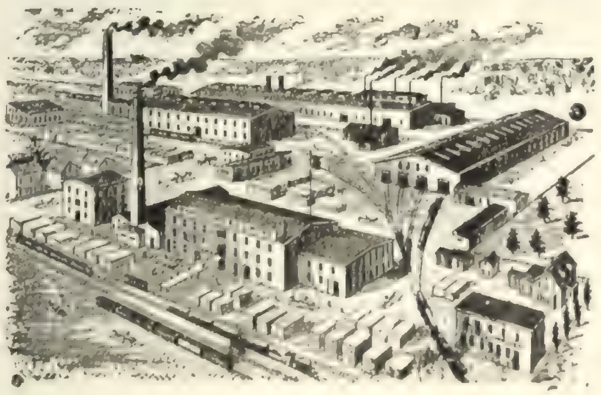

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SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. **Amherst, N. S.**
BRANCHES AT
Halifax **Sydney**

Ornamental Wrought Iron Work

We make and design Wrought Iron Brackets, Lanterns and Lamps, Lamp Standards, Grills and Railings

Architects designs executed with fidelity and spirit.

Dennis Wire & Iron Works Co. Limited
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New Glasgow — Nova Scotia

STEEL MERCHANTS
AND
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Steel Railway and Highway Bridges, Steel Frame and Mill Buildings, Structural Steel and Plate Work of any description.

Capacity 9000 tons per annum.

Shop is equipped with High Speed Electric Cranes and Modern Heavy Duty Tools, Can handle single pieces structural work of 40 tons.

Large Stock of Beams, Channels, Angles, Tees, Plates, etc., for prompt shipment.

Stock yard runway 800-ft. long, crane 70-ft. span.

Shipping runway 400-feet long, crane 80-ft. span.

Delivery yard runway 120-feet long, cranes 40-ft. span.

Orders and Inquiries Solicited

Be Prepared

for any Contract that may come along, being sure that all your Equipment is RELIABLE.

WE MANUFACTURE

Dump Cars, Axles Wheels, Etc.

and our products have given general satisfaction.

Write for references.
Enquiries and correspondence respectfully solicited.

The Smith Foundry Co.

LIMITED

Manufacturers of Contractors' Needs of Every Kind.

FREDERICTON, N. B.

TRENCHING MACHINES

This year, labor is going to be scarce and very expensive. The amount of municipal work is going to be large and unless the Contractor uses the proper machine he will be behind time. If he gets one of our "Trenching Machines," which can make a cut all the way from 27 in. to 60 in. wide and any depth down to 20 ft., he will be sure to fulfil his engagements and save a big percentage of money.

For further information, apply to

J. W. HARRIS MANUFACTURING CO.

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Lap Welded Steel Pipe

MADE IN SIZES

12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.

Ask our Welded Pipe Dept. for prices.

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MANUFACTURERS OF

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FORGED STEEL FLANGES

50 Church St. New York Box 485 Chicago, Ill.

Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers

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Crushed Stone

All sizes. For Roadways and Sidewalks also specially adapted for

Reinforced Concrete Construction

Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

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General Steel Contractors

Large stock I Beams, Channels, Angles, Tees, Zees, and Plates always on hand.

Canada Lumberman & Wood Worker

Toronto, Canada

The Des Moines Hemispherical Bottom Steel Tanks and Towers

have been used and approved by nearly all leading Engineers. They are undoubtedly the most economical means of storing water at an elevation.

We have built many of these in Canada the United States and Mexico.

Estimates cheerfully furnished.

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M. Beatty & Sons, Limited

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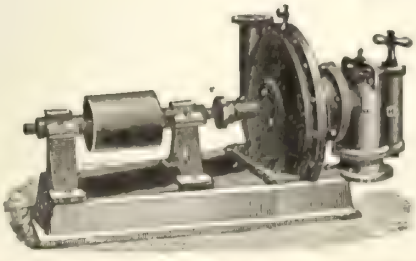
Dredges, Ditchers, Derricks,

Steel Dump and Deck Scows



Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
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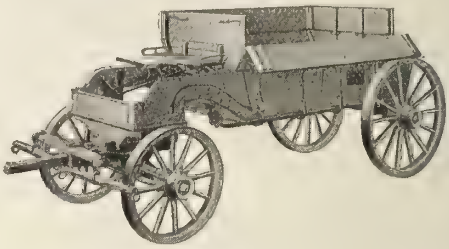
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery.

A YEAR'S SUPPLY IN ADVANCE

QUALITY, of itself, is not sufficient for Watson wheel stock. Strictly second growth "A" grade white oak spokes is not all. Neither can we stop with XXX white oak rims; or with the best black birch hubs. We must have *quantity* as well quality, because our big supply is your safeguard against unseasoned wheel stock.

The big storeroom shown hear is filled with hubs, spokes and rims. It was designed for that exclusive purpose. There's a year's supply of wheel stock in that building. Think of it! We could run for a year and look no further for supply. But we don't. We always keep it replenished. No wheel stock goes from car to wagon. Not by any means. We can't afford to build wheels that way.



And still the orders come. We are shipping promptly.

Write for prices on the Watson—"First in the field, last in the repair shop"

Watson Wagon Company

THE WORLD'S LARGEST DUMPING WAGON BUILDERS
CANASTOTA, NEW YORK

ALSO OFFICES IN
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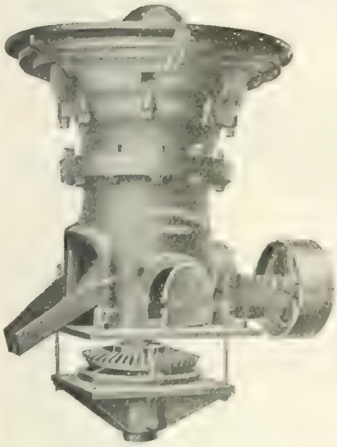

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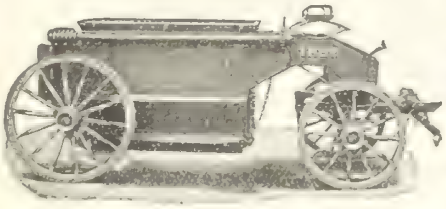

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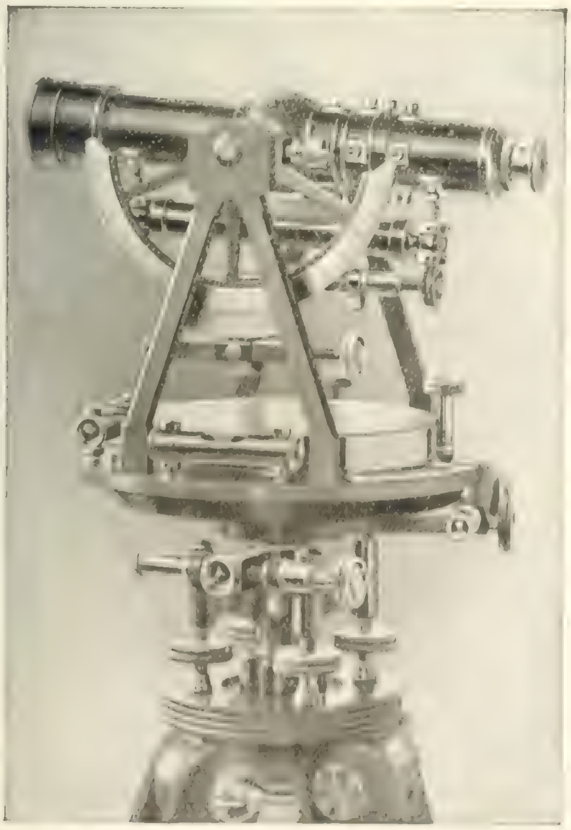

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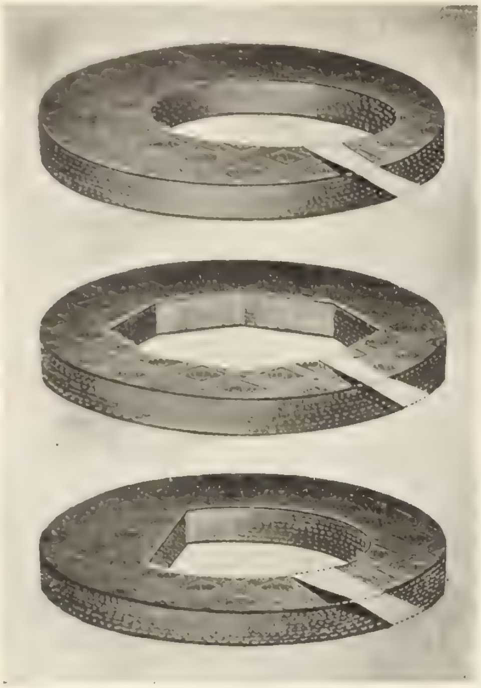

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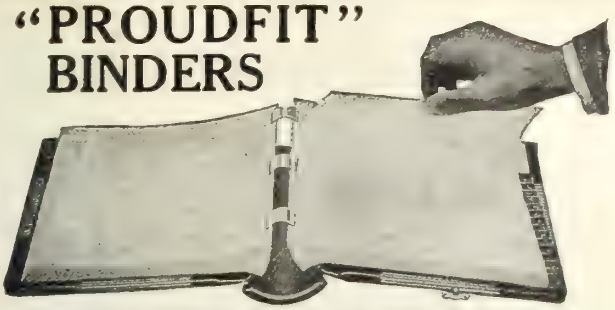

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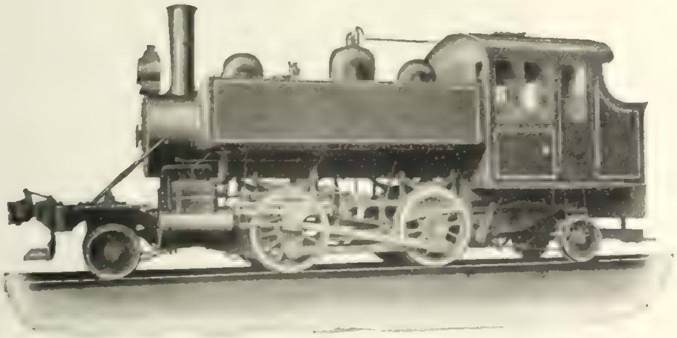

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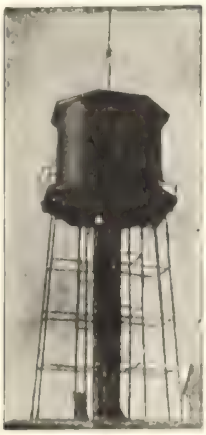

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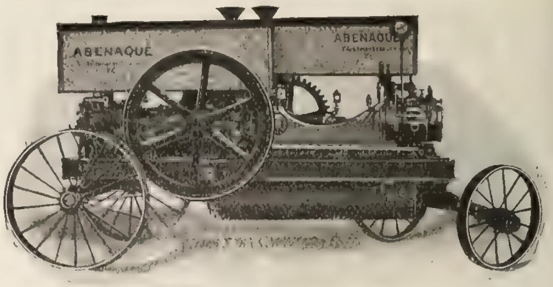

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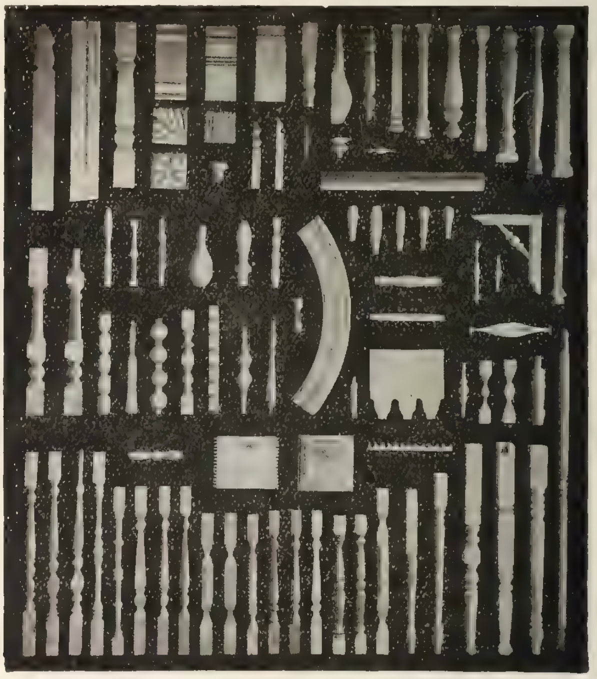

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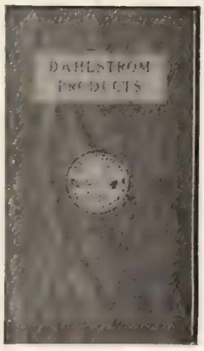
Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.



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No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 and 30 per cent. for approved specifications:—

		Star	D.D.
10 to 25	united inches	$4.25	$ 6.25
26 to 40	"	4.65	6.75
41 to 50	"	5.10	7.50
51 to 60	"	5.35	8.50
61 to 70	"	5.75	9.75
71 to 80	"	6.25	11.00
81 to 85	"	7.00	12.50
86 to 90	"		15.00
91 to 95	"		17.50
96 to 100	"		20.50
101 to 105	"		24.00
106 to 110	"		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.05	$4.40
40	3.25	4.75
50	3.65	5.55
60	3.90	6.00
70	4.15	6.50
80	4.65	7.00
85	5.10	7.85
90		9.10
95		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

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No. 4½ Fuller's .... net $2.35

Square head brass cocks, 60 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

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Lead pipe, 20 per cent. off; lead waste, 20 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)	Black				Galvanized
¼ inch	.	$1.87	¼ inch		$2.70
⅜ "	....	1.87	⅜ "	2.70	2.57
½ "	2.47	2.35	½ "	3.40	3.23
¾ "	2.88	2.75	¾ "	4.03	3.83
1 "	4.13	3.93	1 "	5.78	5.48
1¼ "	5.63	5.35	1¼ "	7.88	7.49
1½ "	6.75	6.44	1½ "	9.45	8.98
2 "	8.46	8.05	2 "	12.06	11.46
2½ "	13.51	12.85	2½ "	19.26	18.30
3 "	17.74	16.86	3 "	25.29	24.03

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

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Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

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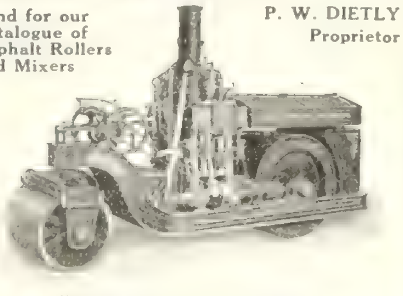

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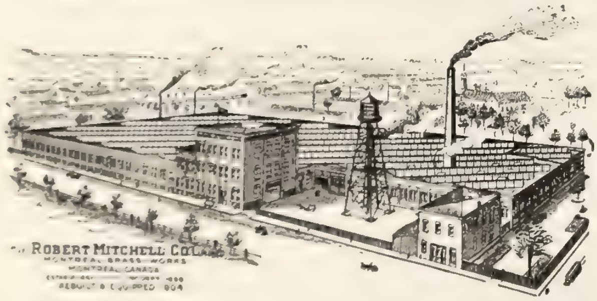

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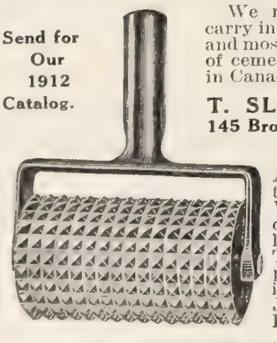

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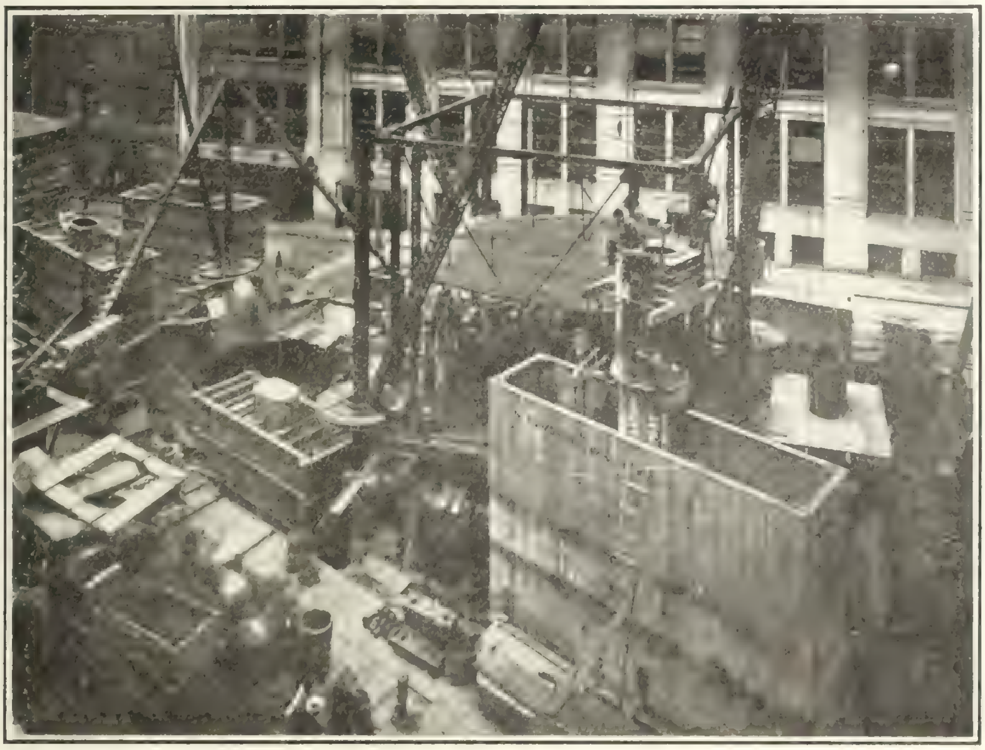

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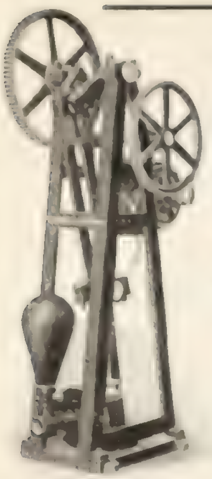

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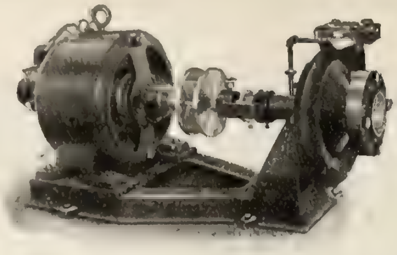

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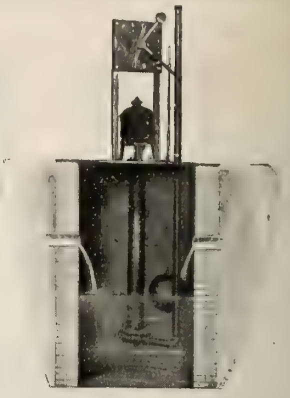

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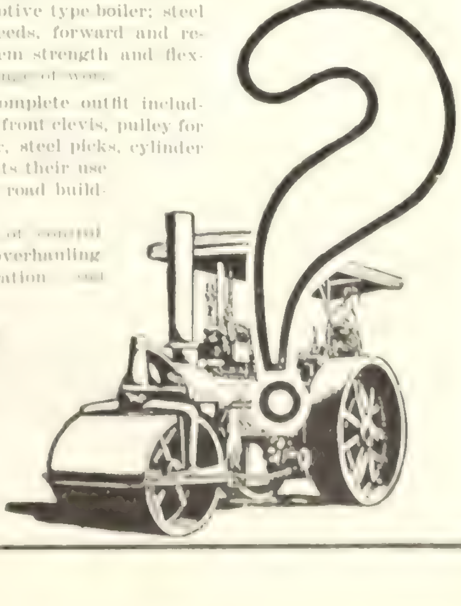

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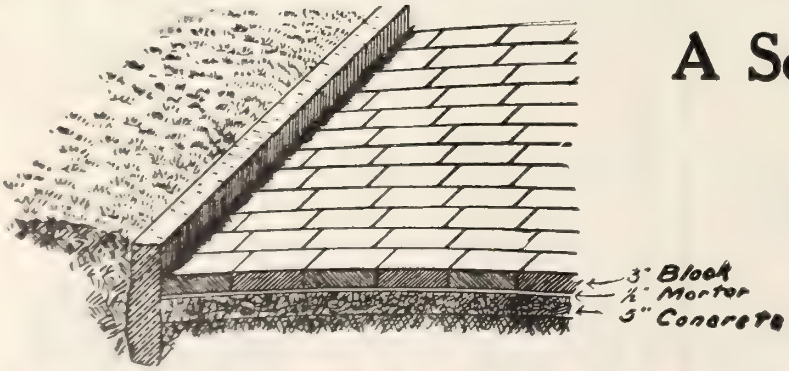

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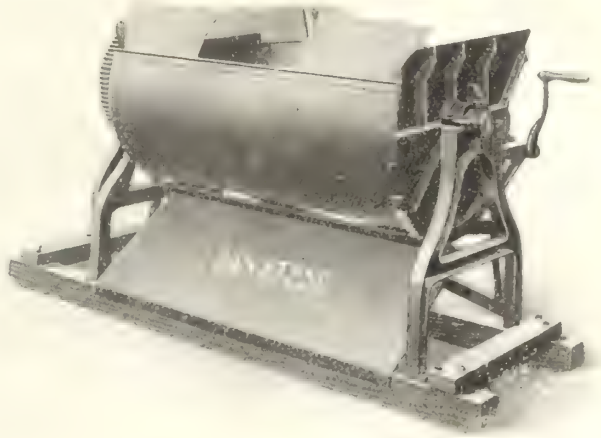

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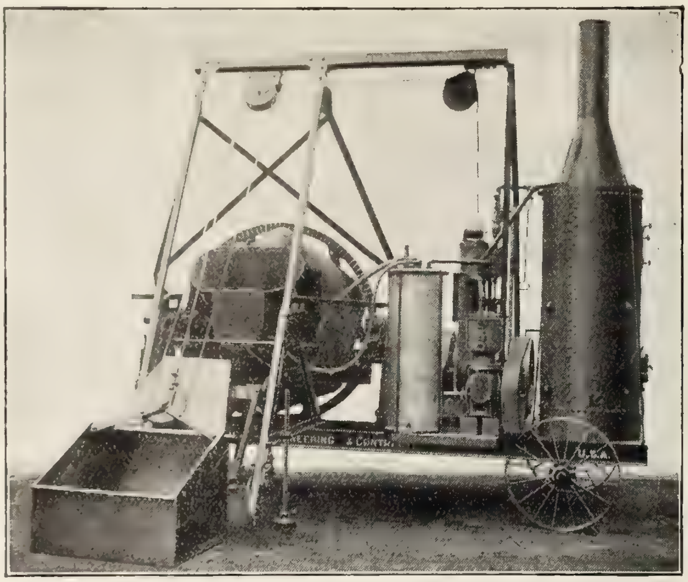

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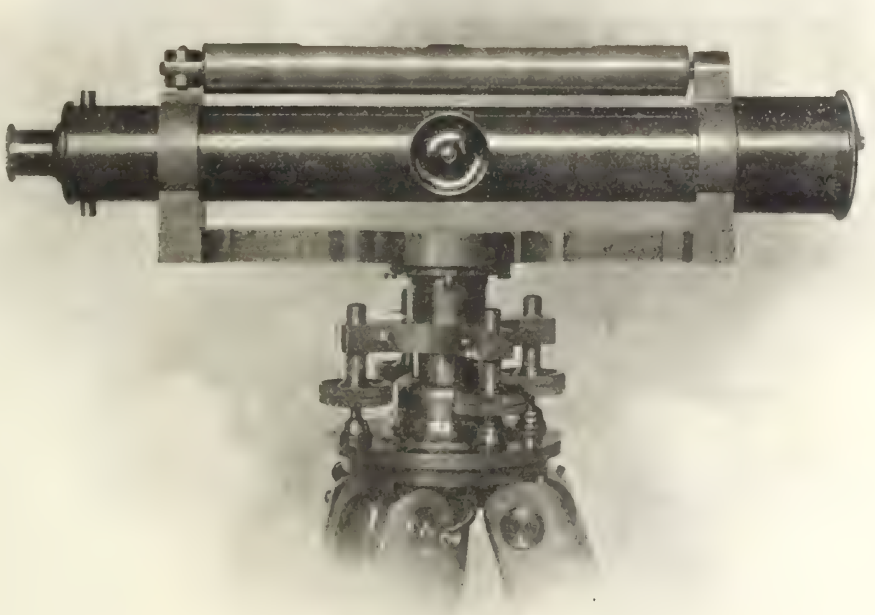

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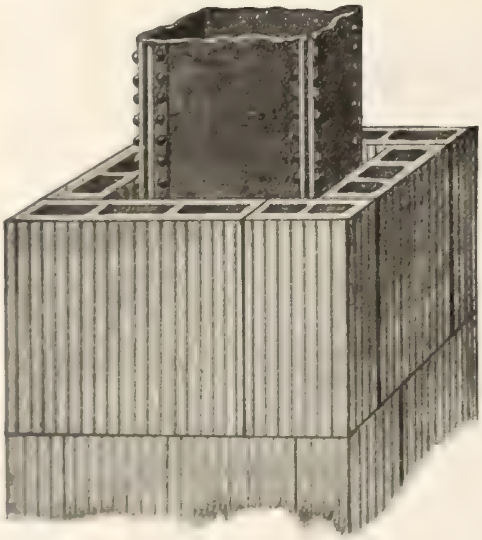
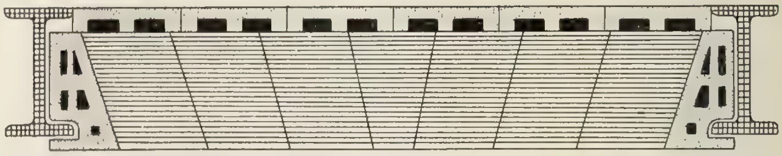
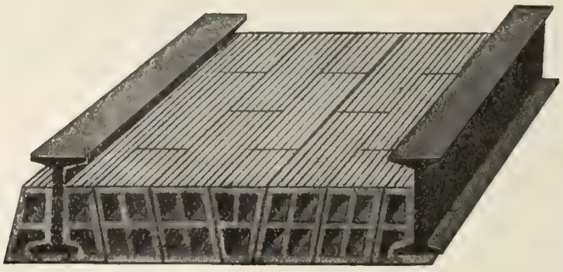


Perspective of Column Covering



Type of Floor Arching—End Construction



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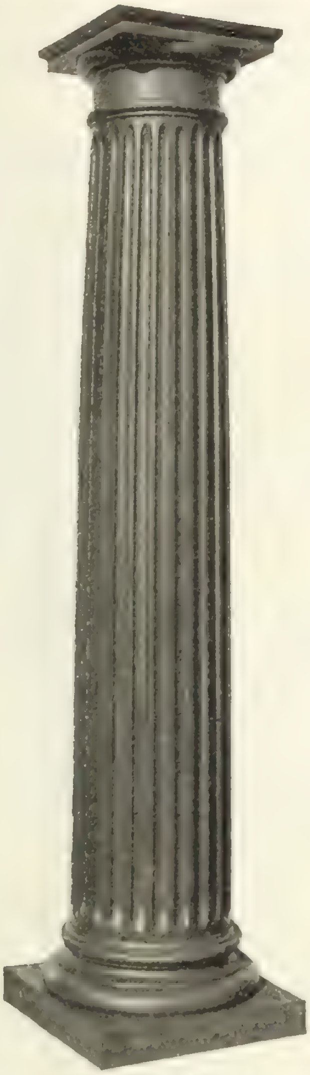

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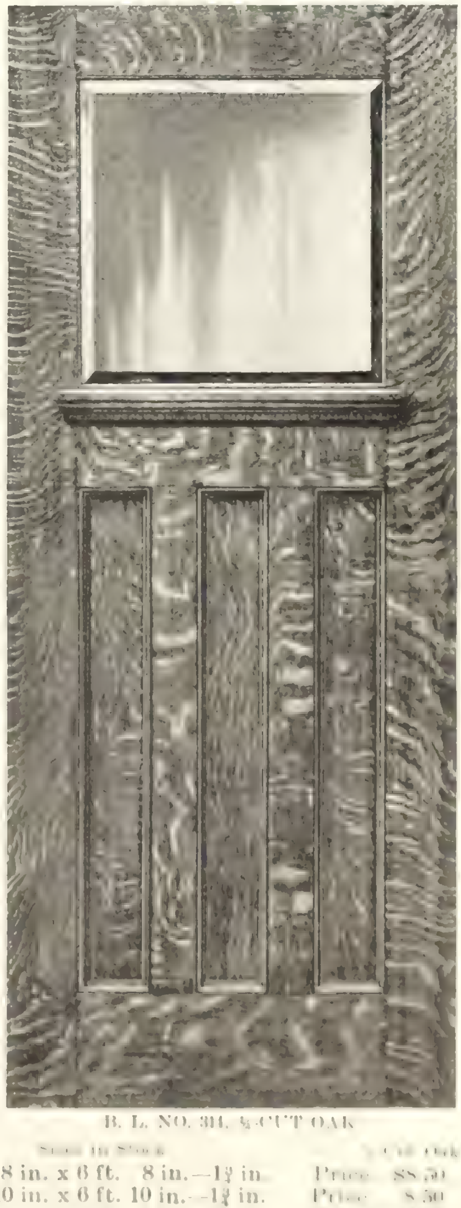

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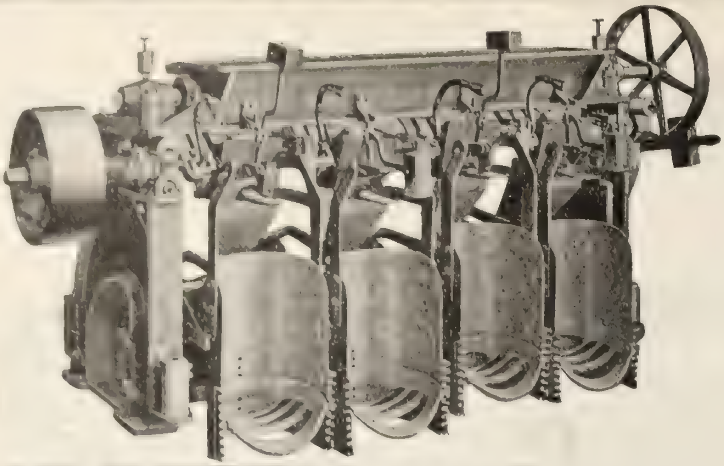

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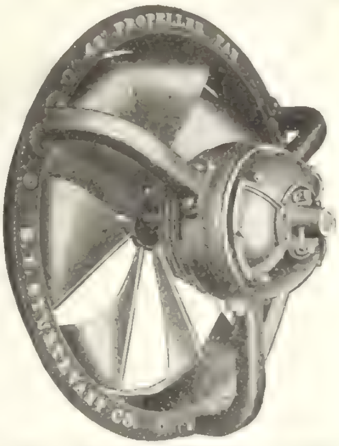

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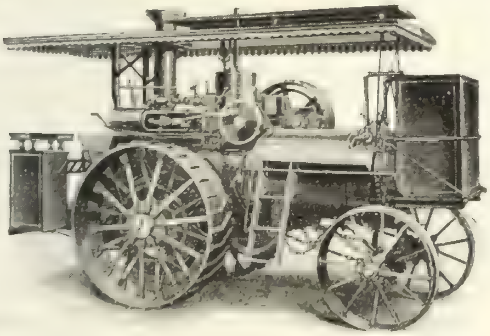

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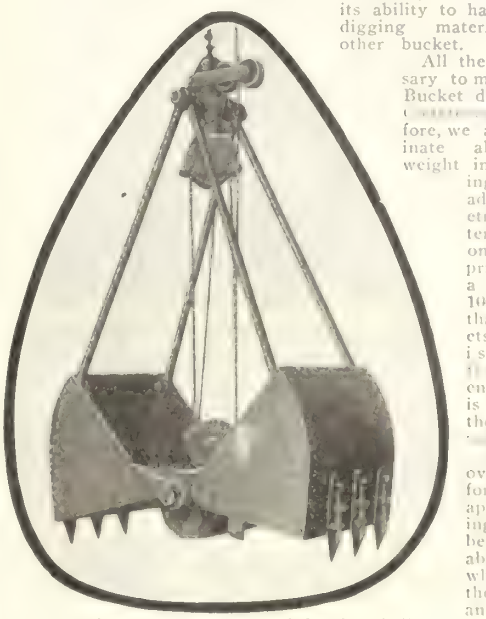

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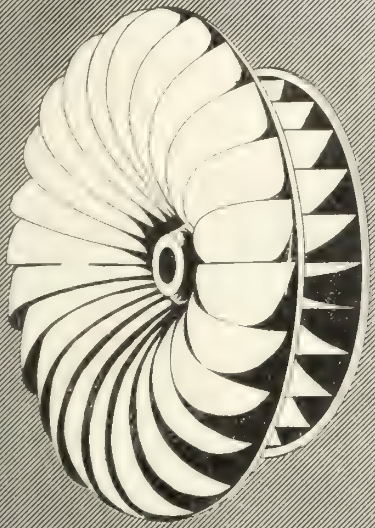

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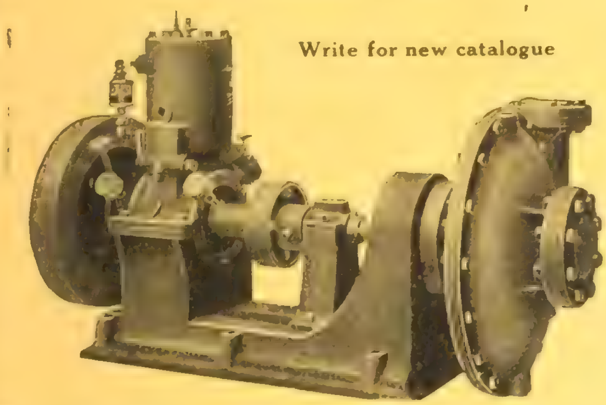

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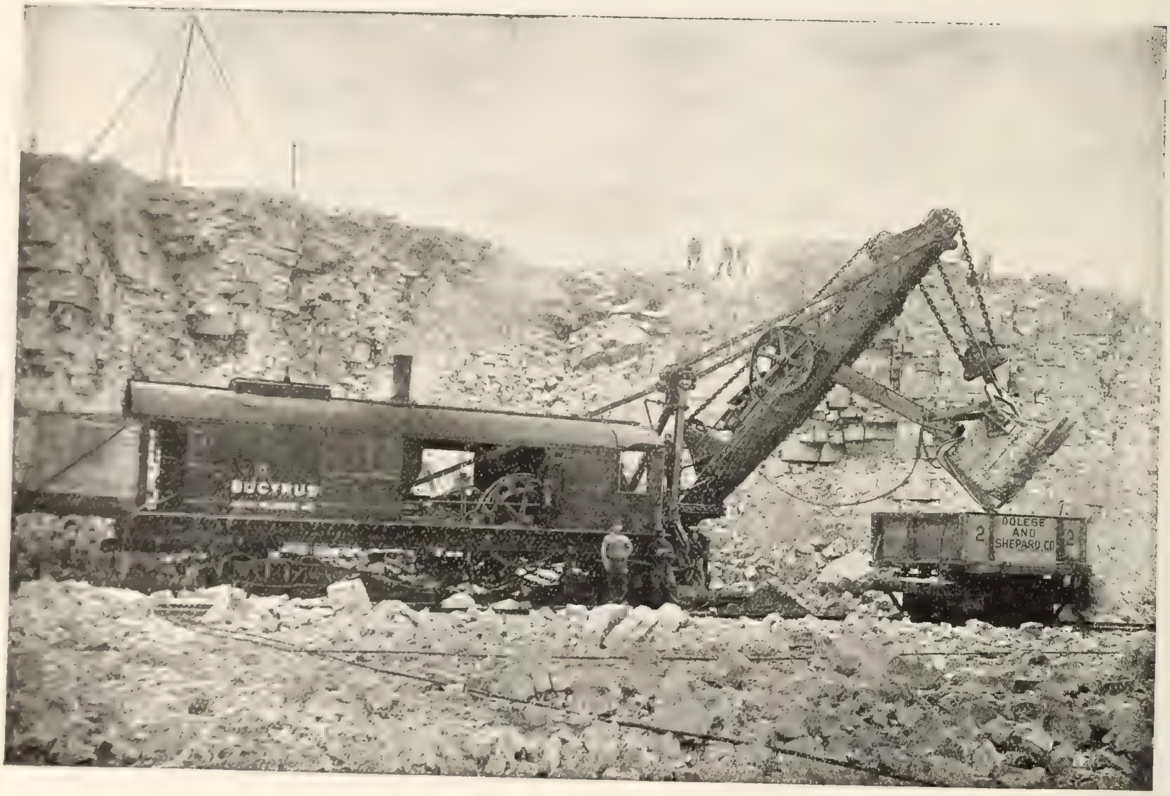

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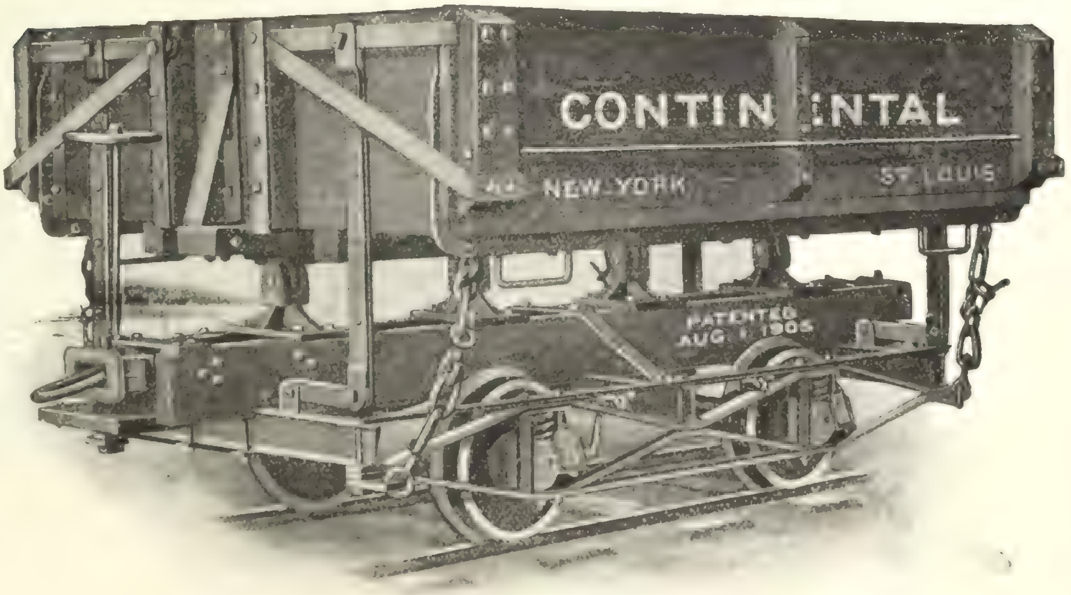

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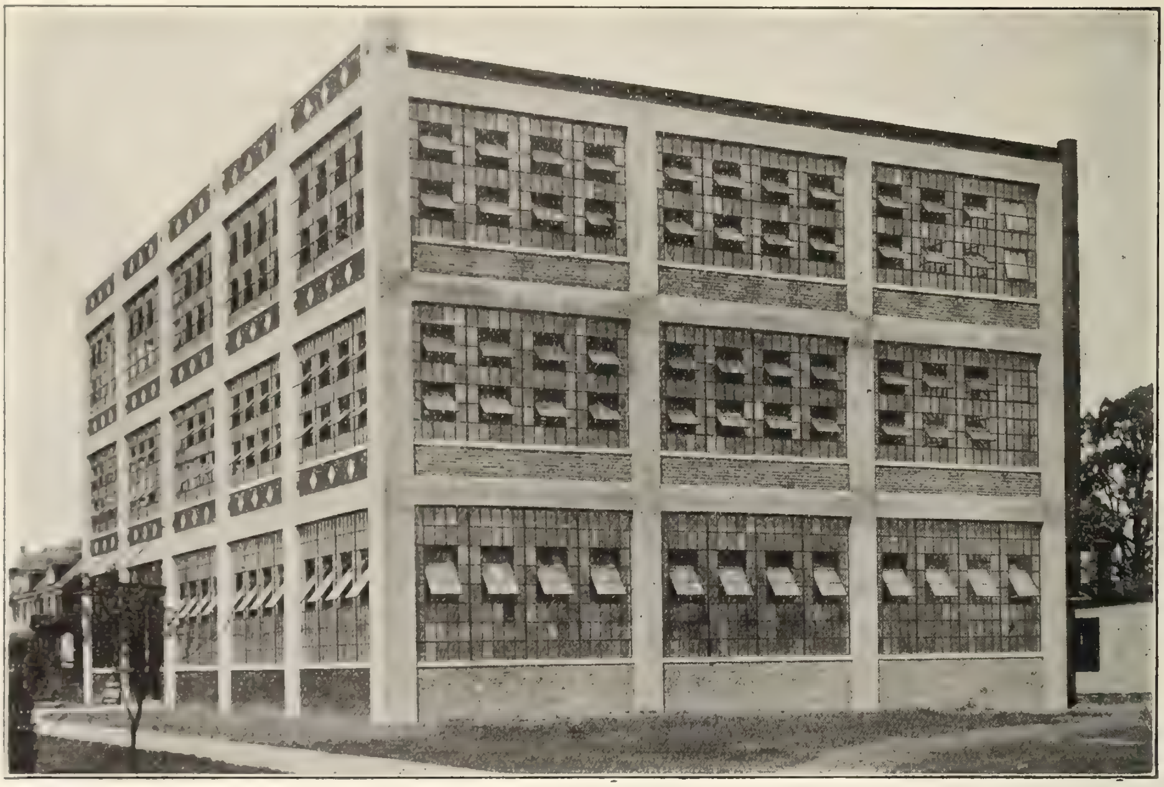

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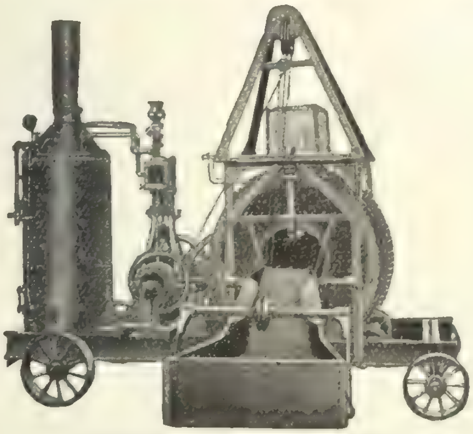
Are Built in Many Styles and Sizes



London Standard Drum Batch Mixer

The MANY NEW and IMPROVED features of the LONDON MIXERS appeal to the contractor.

London Automatic Batch Mixer No. 2

The Enormous Sale of those machines is sufficient proof as to satisfaction they are giving. Everything made in our own shops.

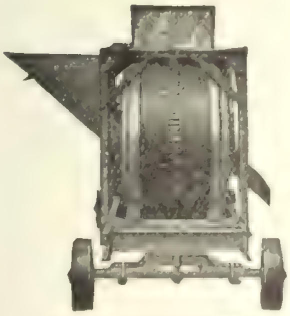
Every machine HIGH-GRADE

Every machine sold under a STRONG GUARANTEE.

London Sill Step and Window Cap Mould

SEND FOR OUR 1912 CATALOGUE which shows our complete line. 160 pages of illustrated matter. It's a dandy.

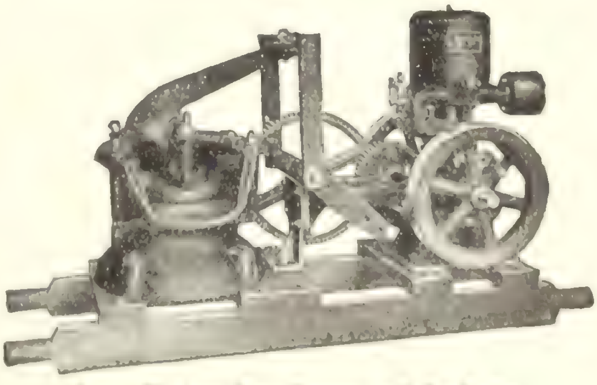
We Manufacture a Complete Line of Concrete Machinery, Cement Working Tools, Hoisting Engines and Contractors' Tools



London Standard Drum Batch Mixer

WE ARE THE LARGEST MANUFACTURERS OF CONCRETE MACHINERY IN CANADA. That is why we can sell at such remarkably low prices.

Producing in large quantities reduces the cost of production.



Power Diaphram Pump Operated with Gas Engine

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

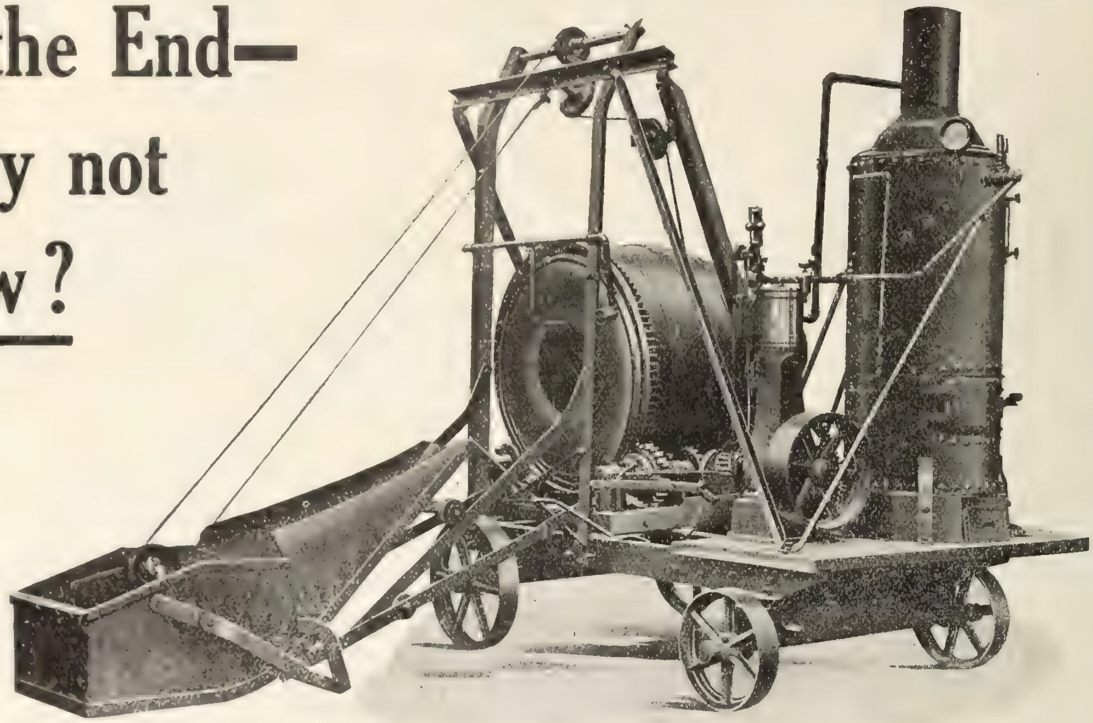
Toronto Office: N.E. Cor. Richmond & Bay Sts. Winnipeg Office: 445 Main St. Winnipeg, Man.

AGENTS:

The Foss & Hill Machinery Co., Montreal, Que.
G. B. Oland, Halifax, N. S.
Hamilton Machinery Co., Calgary, Alta.
B. C. Equipment Co., Vancouver, B. C.

We are the Largest Manufacturers of Concrete Machinery in Canada

It will Mean a "Wettlaufer Heartshape" In the End—Why not Now?



The Time to Save Money on a Concrete Mixer is NOT WHEN You Buy---BUT AFTER

Prices on "Wettlaufer Heartshape" Mixers will compare very favorably with any mixer on the market. To the enormous advantages to be gained by using a "Wettlaufer Heartshape", add the saving of time and money for every days' work it does--there is your reason for investigating the merits of this Mixer. There is no flimsiness either in our selling talk or in the machine. Our arguments are hard facts—we can prove every one. The selling points are right there on the Mixer—you can see them for yourself.

The above illustration shows our No. 3 Improved "Heartshape" Road Mixer. There are hundreds of this particular design Mixer at present in use and the entire satisfaction it has given in every case gives conclusive proof of its efficiency. We have the figures of numerous firms that show that this mixer has effected a direct saving over all other methods.

The Economy of Operation

Automatic controlled. One man operates the entire machine.

Quick Work

each revolution of the HEARTSHAPE DRUM turns the batch end for end thus ensuring a quick and positive mix.

Long Life—No Breakdowns

All parts including all bearings, gears, etc., of Wettlaufer Concrete Mixers are semi-steel castings. With our new oiling system all bearings are fed direct from the centre of the bearing. By this means all the grit is forced out of the bearings, thus reducing the wear to a minimum and giving the mixer a 50% longer life.

WETTLAUFER BROS.

FACTORIES : **Mitchell, Ont.** **Buffalo, N. Y.** **Detroit, Mich.**

AGENCIES :

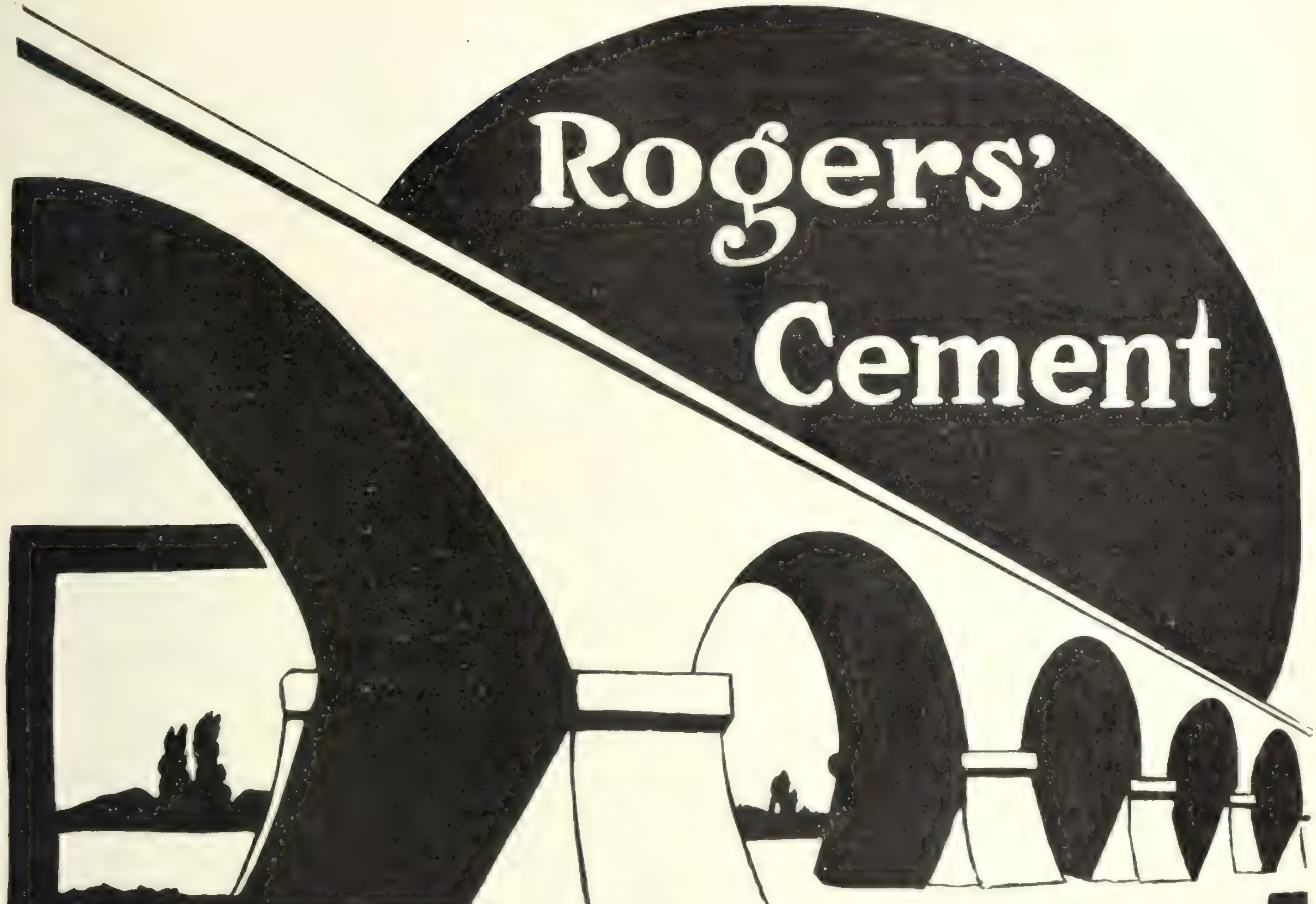
A. R. Williams Machinery Co.
15 Dock St. St. John, N. B.

Lavallee Ross, Limited
Alexandra Block, Howard Ave.
Edmonton, Alta.

Hooton & Moore
613 Ashdown Block,
Winnipeg, Man.

MONTREAL OFFICE and WAREROOMS : **316 Lagauchetiere St. W.**

Head Office : Toronto, Ont., 178 Spadina Ave.



IN order that the engineer may have an unvarying and dependable concrete, ROGERS CEMENT is carefully maintained uniform as to its constituents, and the most careful grinding and screening is given the product.

The consequence is the ROGERS CEMENT has great covering power, quick set, and extraordinary strength of set, even in the bulkier concretes, with minimum mixing troubles and delays for the contractor.

Specify ROGERS CEMENT to obtain satisfactory concrete construction within a reasonable period and without aelays due to non-uniformity in the cement.

It Pays to Always Specify
ROGERS CEMENT

Rogers Cemeut is a time-saver because it is uniform. It is satisfactory because carefully kept to a standard.

Mills located at Atwood, Hanover, Orangeville, Owen Sound, Kirkfield, St. Mary's and Wiarton.

CRUSHED STONE

For Sidewalks, Concrete Road and other Contracts

WE can furnish crushed stone in all sizes, clean and free from dust, dirt, and mold, and evenly graded.

We can guarantee delivery in any quantity. Write, phone, or wire your orders.

Plants at Dundas and Vinemount

ALFRED ROGERS LIMITED,

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TORONTO

Western Representative, N. J. Dinnen & Co., Winnipeg

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Canadian Fairbanks

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Canadian Supply Company
Galt Art Metal Co.
Metallic Roofing Co.
Noble, Clarence W.
Paterson Mfg. Co.

(Continued on page 14)

Durable Roads

For the **highest efficiency** in waterproof macadam road construction—for the most durable, dustless, waterproof, trafficproof roads at the **lowest cost** per mile per year of service—engineers should specify

"Pioneer" Road Asphalt

Road experts everywhere are enthusiastic over their success with "PIONEER."

If interested in **durable** road construction write us for specifications and data.

Build up your old macadam roads by using **"Pioneer" Road Surface Asphalt.** Makes a smooth, rubbery surface—and one application will lay the dust for an entire year! Write for specifications on **Road Surface Asphalt,** also on **"PIONEER" Filler Asphalt and "PIONEER" Paving Cement.**

The Canadian Mineral Rubber Company, Ltd.

503 Canada Building, WINNIPEG

Driwal

Waterproofs Concrete,
Cement Stucco, Stone
and Brick Surfaces

¶ The coatings are all liquids and become effective by penetrating into and filling the pores of the cement; thereby making it waterproof without changing the texture of the surface.

¶ With the fourteen colored coatings the surface can be waterproofed and decorated in one operation.

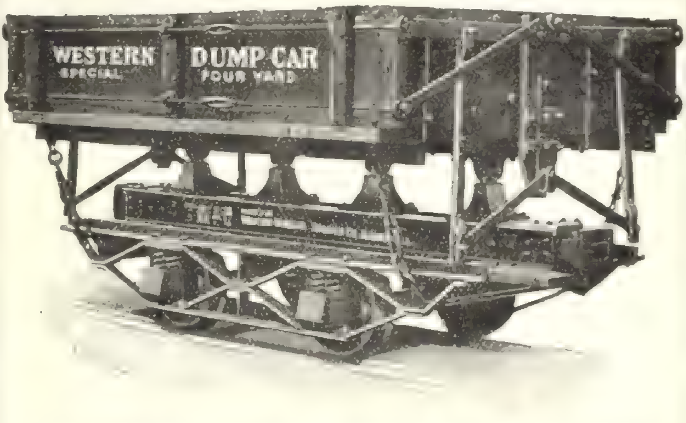
¶ With transparent Driwal the surface can be waterproofed without changing either its color or texture.

¶ Black Driwal is made in three consistencies to meet the exacting requirements in suitable waterproofing and bonding liquids for foundation walls, tunnels, reservoirs, cisterns, swimming tanks, etc.

¶ Write for illustrated booklet and color card, with specifications and approximate costs.

THE BILLINGS-CHAPIN CO.
BOSTON CLEVELAND NEW YORK

The Contractor's Dump Car Without a Blemish
with the ability to do the hardest service is the
Western Special 4-Yard Car



All castings malleable, beds supported by four heavy pedestals and hinges; 20″ wheels; forged axles, M. C. B. type with collars and dust guards; couplers broader and deeper, giving greater wearing surface and with yoke attachment; steel I-beam draft beam.

This car has also the celebrated Western features:—pivotal doors, steep dumping angle, enabling it to be dumped easiest in shortest time, loose hinge construction, two springs over each journal, improved door construction. Not a detail neglected.

Our catalog describes the largest line of dump cars, earth and rock handling machinery made, Write for it.

Western Wheeled Scraper Company
Aurora - Illinois.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902
Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or $5\frac{2}{3}$c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.
Limited
Hagersville, Ont.

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  American Water Softener

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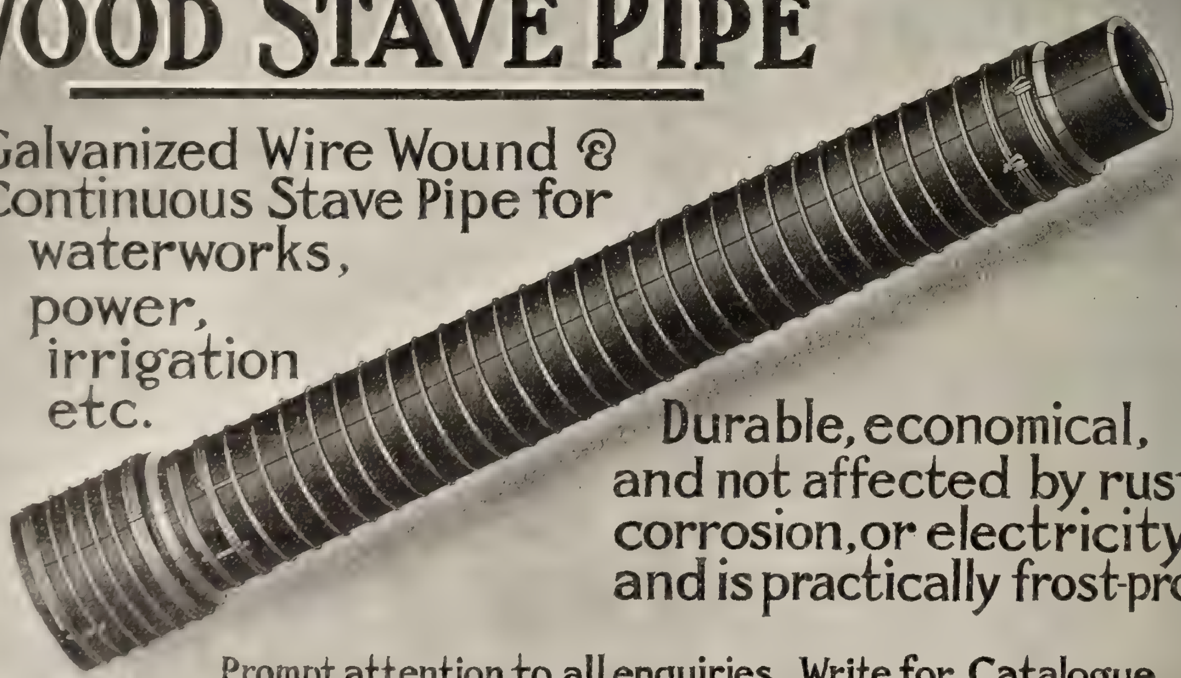

WOOD STAVE PIPE

Galvanized Wire Wound & Continuous Stave Pipe for waterworks, power, irrigation etc.

Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

The Dominion Wood Pipe Company, Limited
New Westminster, B.C.

Barrett Specification Roofs

ON THE "CONCRETE CITY"

In the illustration below the Turner Construction Company, of New York, has brought together in a scale drawing an accurate representation of most of the important modern concrete buildings which they have erected during the past nine years, at an approximate cost of $12,000,000.

It is an imposing display of best types of modern construction—"a concrete city" indeed—scientifically designed for maximum service at minimum cost and minimum maintenance.

In the use of concrete, the designers of these buildings planned for economy—the real economy that results from adequate strength and no repairs.

Barrett Specification Roofs are a real economy, and it is significant that 95 per cent. of the entire roof area is covered with this type of roofing. The figures are as follows:

Barrett Specification type of Roofs	1,490,523 sq. feet
Plastic Roofings	14,714 sq. feet
Slate Roofings	21,640 sq. feet
Tile Roofings	5,619 sq. feet
Ready Roofings	38,381 sq. feet
Copper Roofings	6,355 sq. feet
All other kinds	7,448 sq. feet

It is important to remember that while all these buildings were constructed by the Turner Construction Company, the specifications were drawn by a large number of architects and engineers. That the great majority of these specified a Barrett Specification type of roof, emphasizes the fact that whenever this roof is practical the best modern engineering practice will have no other kind.

These roofs were selected for one reason only, namely, that they would give better service at lower cost, than any other roof covering.

Barrett Specification Roofs require no painting or similar attention—in other words, there are no maintenance costs. They will last upwards of 20 years without any care.

That the above statement is conservative may be realized from the fact that roofs of this type have lasted, without attention, for thirty-five years and are still in serviceable condition.

The superior economy of Barrett Specification Roofs justifies their adoption not only on big first-class concrete buildings, but on every flat roofed building from a tenement to a skyscraper—from a small mill to a modern manufacturing plant costing millions—but be sure it's a real Barrett Specification roof—and the only way to be sure is to incorporate The Barrett Specification in full in your plans.

Copy of The Barrett Specification with diagrams free on request. Address our nearest office.

THE PATERSON MFG. CO., Limited, Montreal, Toronto, Winnipeg, Vancouver
THE CARRITTE-PATERSON MFG. CO., Limited, St. John, N. B., Halifax, N. S.

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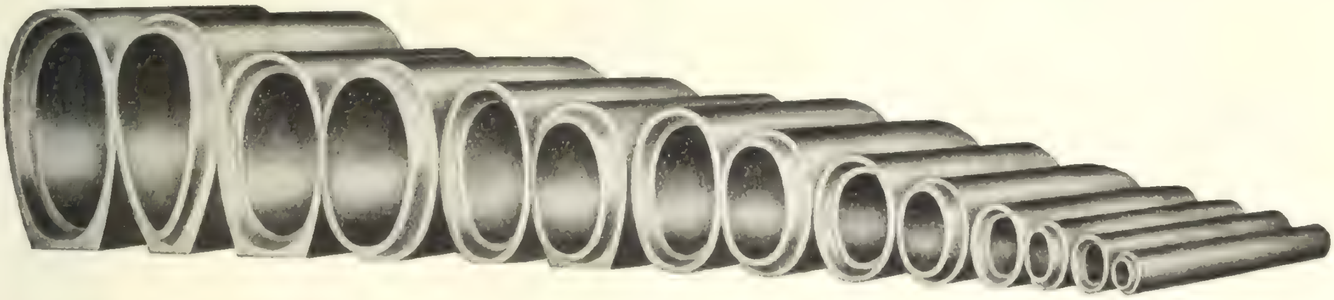

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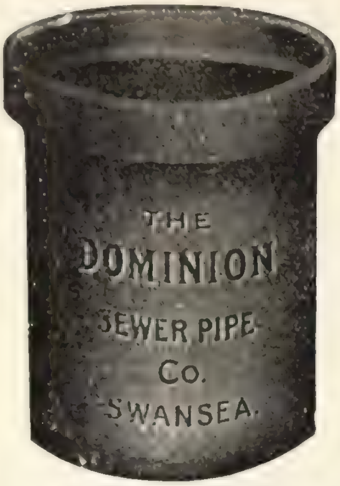

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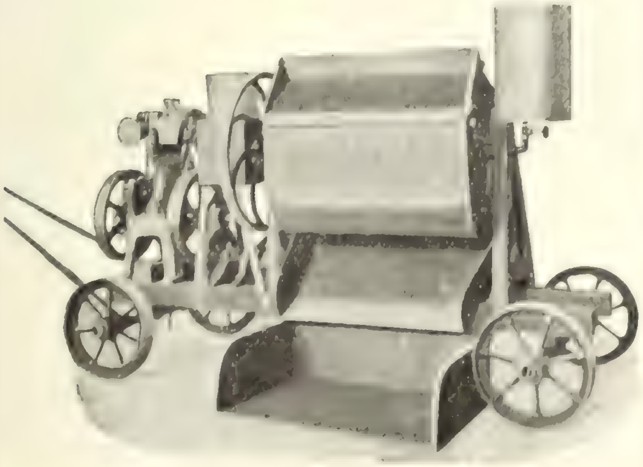

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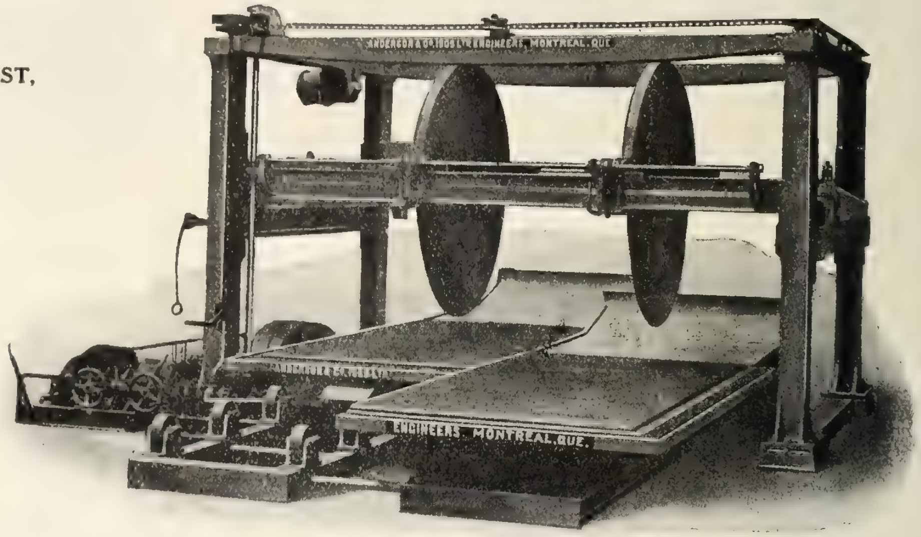

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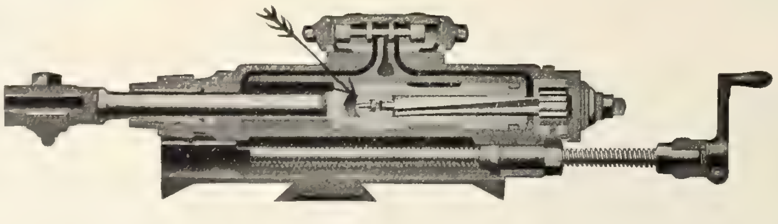

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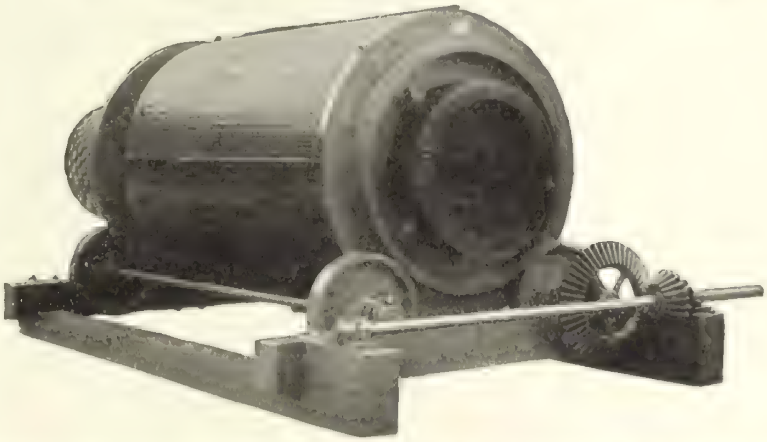

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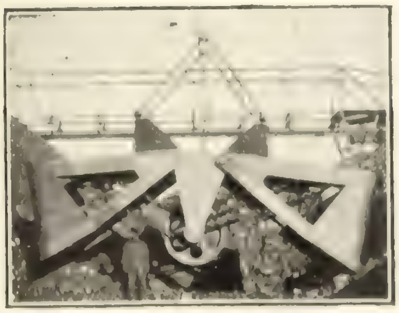

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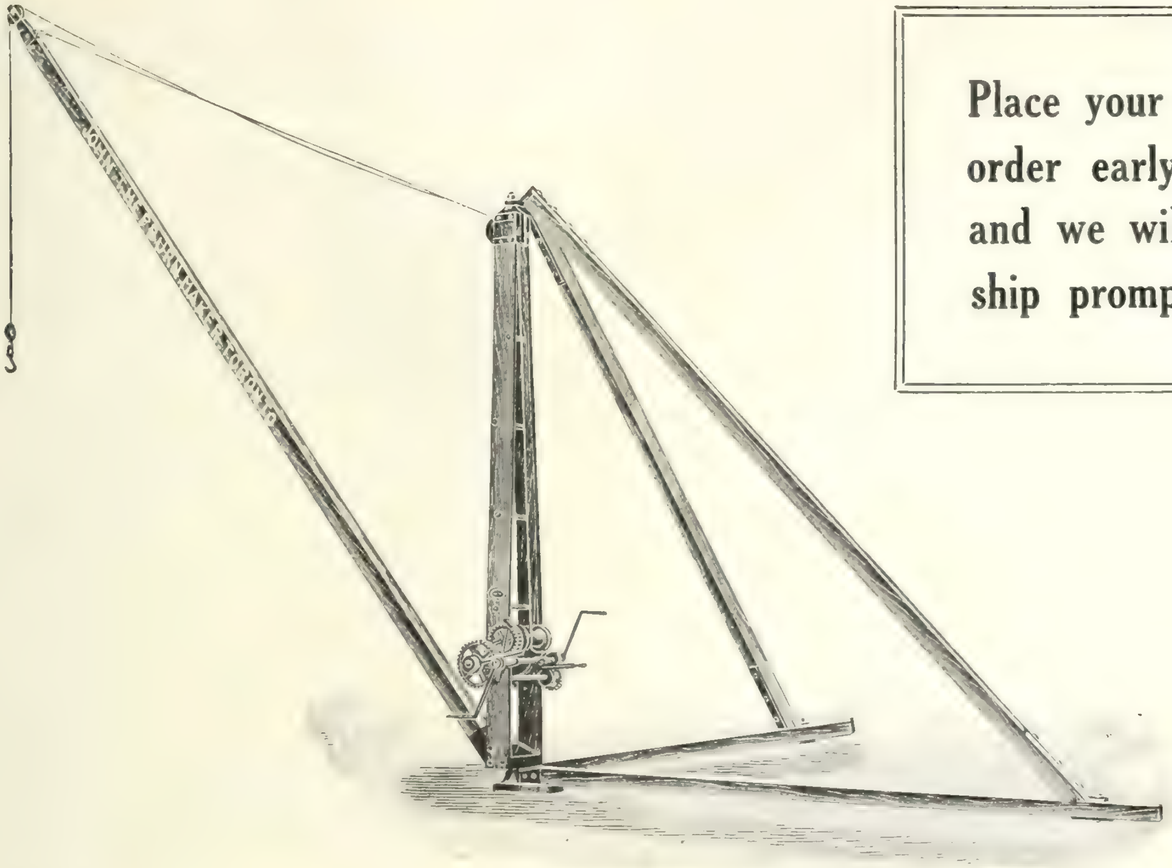
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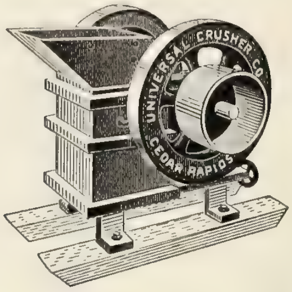

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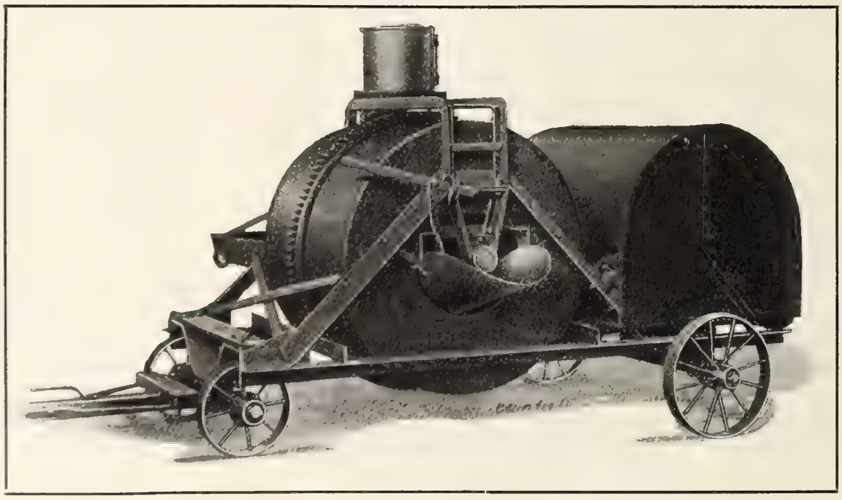

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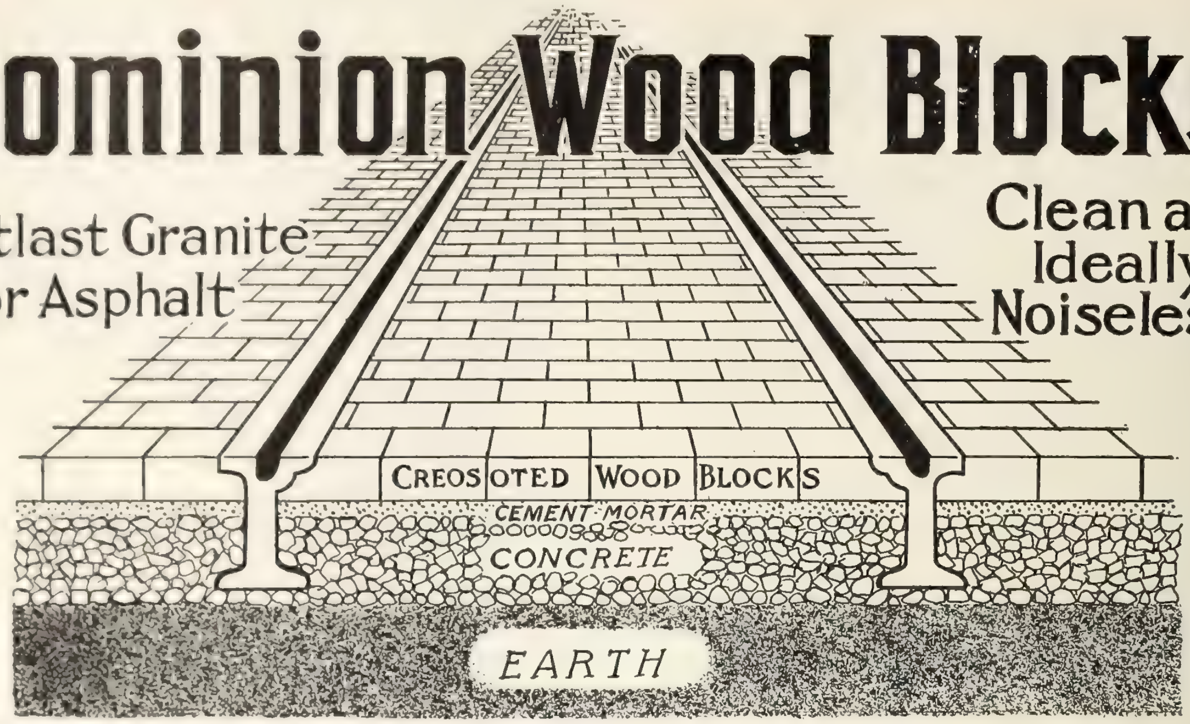

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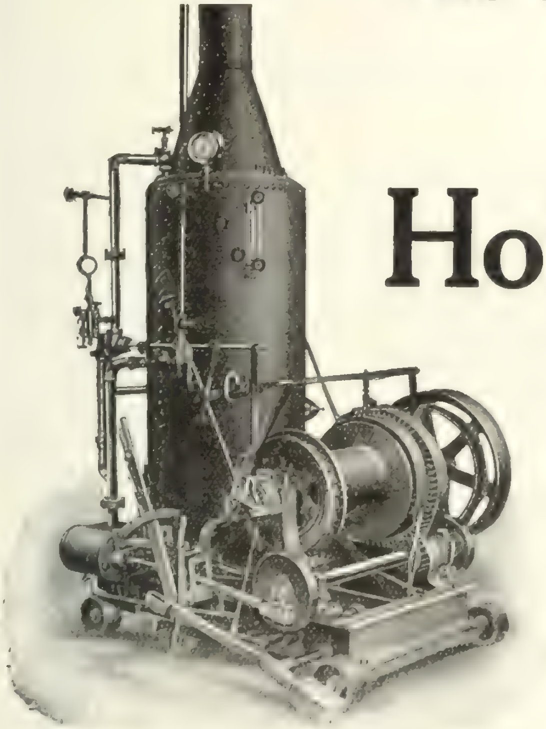

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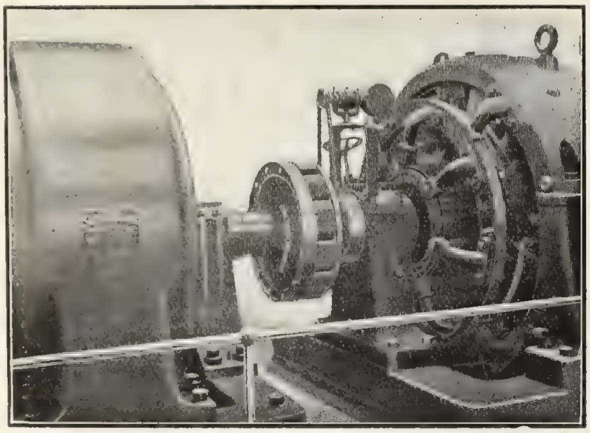

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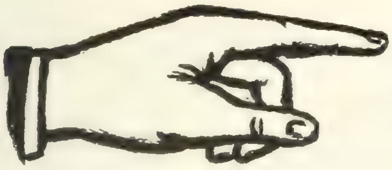

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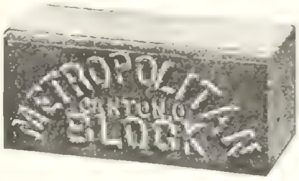

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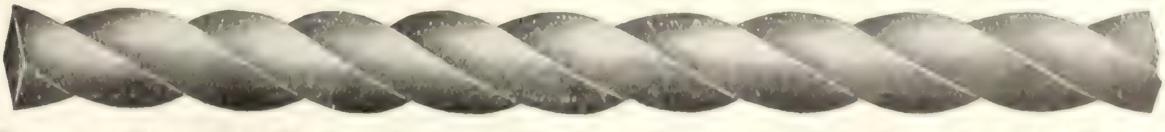

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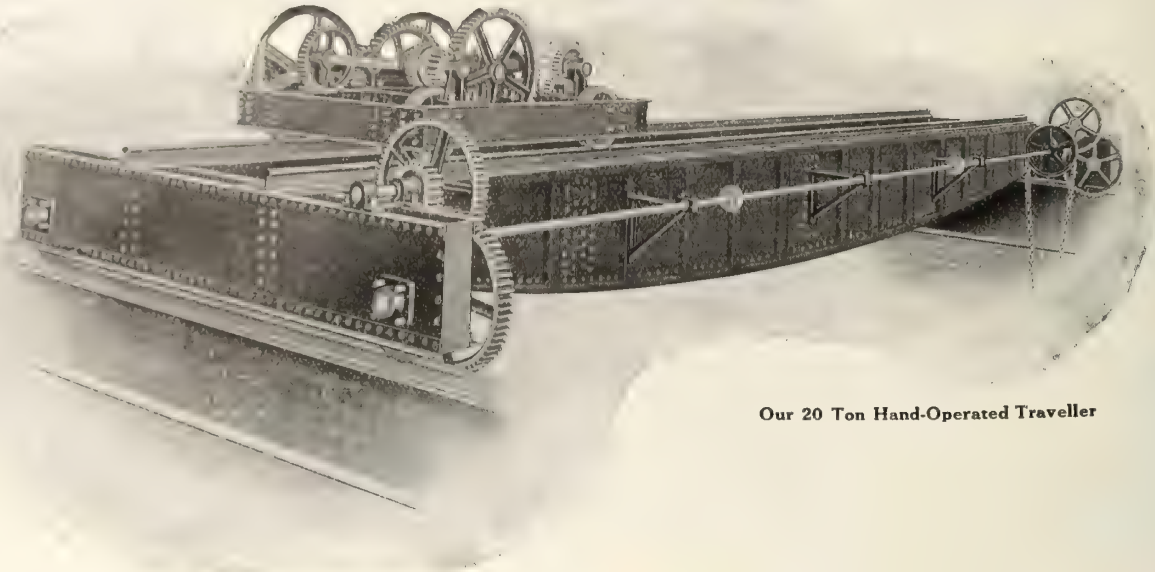

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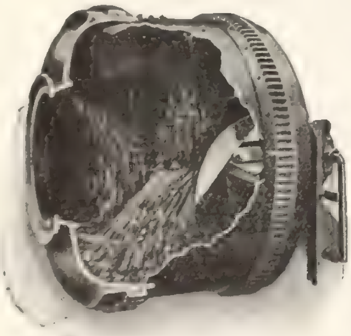

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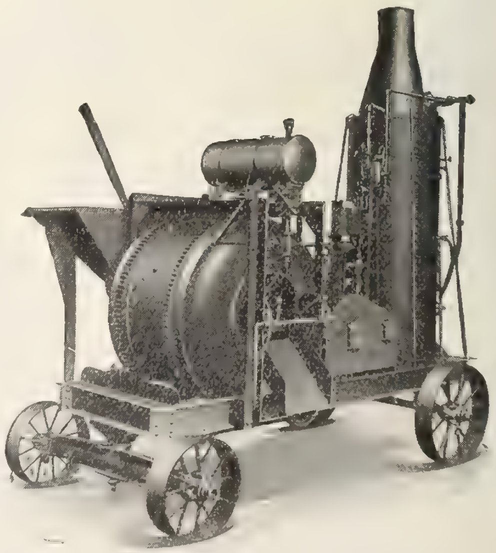

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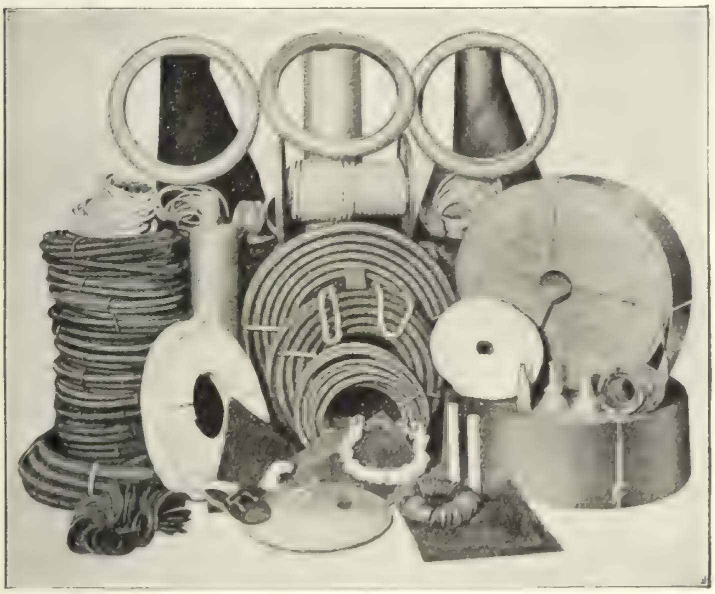

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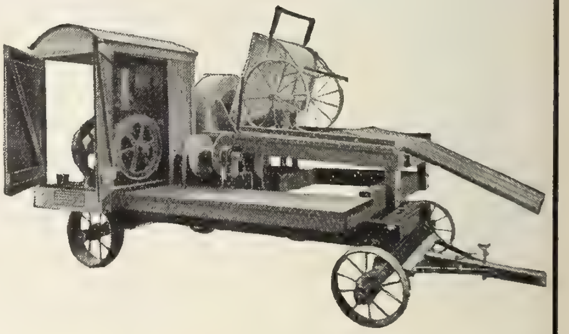

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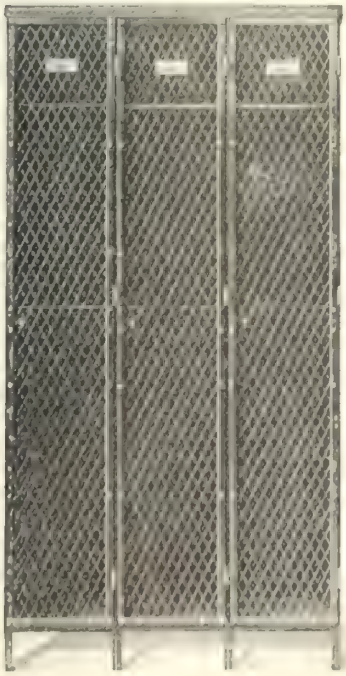

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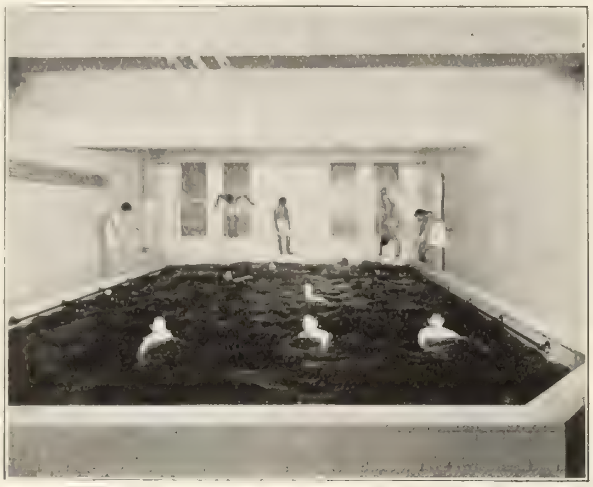

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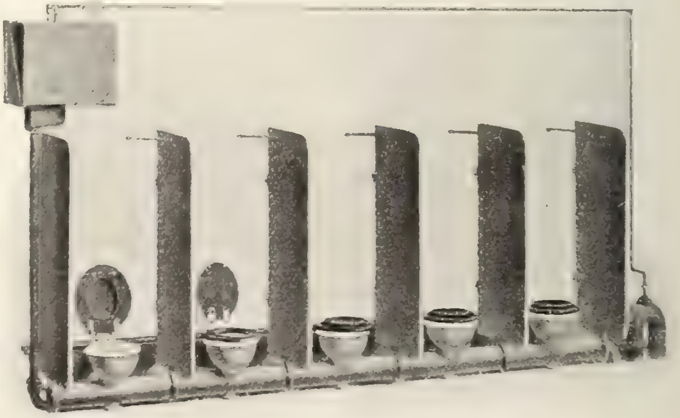

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Vol. 26 June 12, 1912 No. 24

Meaning and Progress of City Planning

THE recent criticism of the various improvements that have been made of late years at the Federal Capital, which was the subject of an article in our issue of June 12, is particularly timely just now as bringing forward the subject of intelligent and correlated civic improvement and what it means. If it can be said truthfully that there will never be a more opportune time for the inauguration of town planning schemes at Ottawa, Montreal, Toronto, and in fact generally throughout Canada, it can be said without fear of contradiction that great opportunities have been lost. Montreal is a conspicuous example of a city that "just growed." Ottawa's "piecemeal and isolated development" we have already commented upon. Toronto discusses buch as to what might have been, but undertakes nothing. Generally, the efforts made have been spasmodic and poorly controlled, and so little progress has been made. Certainly there would seem to be the greatest need in Canada for stimulating interest in city planning. It would seem that the first popular belief to be overcome is that city planning schemes mean the hiring of a number of artists to make the city "beautiful;" that under such enterprises the city will be bankrupted, industry hampered and old landmarks destroyed. These ideas are most delusive. City planning, to be successful, must be the work of several experts, each skilled in his special line. The city engineer should take a more important part in this field. It is difficult to understand why this is not more generally appreciated when it is considered that city planning involves so many engineering works with which the municipal engineer is so prominently identified. We are inclined to think that this has been due rather to lack of appreciation on the part of the public than to lack of initiative on the part of the engineer. Certain it is that city planning will never meet with a fair measure of success in Canada until the municipal engineers throughout the country are enrolled in the work.

City planning is an expert field in which amateurs, artists and those who make of it an unpractical hobby should have no part. What we want in Canada today is some central authority in each important town and city to map out and prosecute a satisfactory and comprehensive scheme of improvement. We have been generously endowed with natural advantages and the making or marring of our cities is in our own hands. To fail of such opportunities will bring upon us lasting discredit in the eyes of the older countries who have carried out wonderful schemes of improvement in face of difficulties which might well have been regarded as unsurmountable.

New Roads for Northern Ontario

THE Provincial Government's policy in the development of Northern Ontario is meeting with general approval. Realizing that the railway accommodation is sufficient for some years to come and that the problem of the present consists chiefly in opening up by means of tributary roads the territories adjacent to the railways, the authorities have decided to open new townships for settlement and will construct roads in advance of the settlers. The sum of $350,000 has been set apart for road work this year and the construction will be carried out under the supervision of competent officials. Assurance is given that in all cases the work will be of a most substantial character. There is every probability that a still more comprehensive scheme of development will be undertaken next year and it is reasonable to look for rapid development in a section of the country which promises much for the constructional interests.

Syndicalism—"Organized Industrial Anarchy"

SYNDICALISM is something which all engaged in engineering work in any capacity must consider, now that it is being actively preached in the United States by the Industrial Workers of the World.* So long as it was confined to France, no attention was paid to it here, and even when it complicated the British coal strike most Americans confused it with some sort of trade unionism. Even now few Americans recognize that its manifestations in the textile industry are different from the strikes of trade unions, planned for the purpose of securing for wage-earners a larger share of the profits of the industry as a whole than the owners of the plants consider equitable. Syndicalism as preached by the Industrial Workers is something entirely different, being literally organized militant industrial anarchy. Its aim is to cripple capital on every possible occasion, great or small, when the capital is not supplied by the wage-earners themselves. The most ignorant class of industrial workers, largely people with but little knowledge of the English language and no real appreciation of democratic government, are being enlisted in support of these destructive tenets. There is a danger that its teachings will find favor with the foreigners employed as unskilled laborers on construction work as well as in mills and mines. The danger threatens trade unions as well as investors, since it substitutes for a logical analysis of trade conditions as a basis for adjusting wages an unreasoning perpetual warfare on every form of industry carried on by the coordinated utilization of labor and capital.—Engineering Record.

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* [illegible]

The Quality of Construction

IN elaboration of the ideas expressed in our editorial article* upon the effect of the "lowest bid" principle upon the general quality of construction, a well known paving contractor emphasizes the suggestion that municipalities and others should give their first consideration to the practical and financial ability of the contractor to deliver first-class work consistently with a reasonable figure. Herein, undoubtedly, is the best economy. Our correspondent writes:

"The solution of the troubles that have arisen in the past would be overcome if corporations and others awarding contracts for works, would, before considering the lowest tenderer, give mature consideration to the financial ability of those who wish to carry out the works. In many instances, if this were done, it would remove many incompetent contractors. Too much attention has been paid to awarding contracts to low bidders, irrespective of their ability, experience or financial backing to carry out the work in a satisfactory way according to the specifications.

"I have in mind instances where local influence succeeded in awarding work for curb and gutter to a local contractor at two cents higher than the bid of this company. A unit price for curb and gutter was quoted in connection with our tender for pavements. The council, however, awarded this work to a local contractor who took so long to do the work on account of lack of experience that we lost many hundreds of dollars in being forced to carry out our contract in the early winter and the work (not of great size) was spread over the year, from April to December."

A Question in Ethics for Engineers

THE fact that no authoritative body has yet taken up the task of formulating a code of ethics for the engineering profession in general may justify a question which not infrequently comes before the individual engineer for decision, says the Engineering News. Is it proper for an engineer to sign or approve a report, or make a recommendation, or prepare and sign plans, which are different from or even in opposition to his own convictions on the subject concerned?

We refer here not to the case of the engineer who is under the direction or jurisdiction of a superior engineering authority, although possibly our query could be applied even to this case. The more important case, however, and the one which under modern administrative and governmental conditions more frequently gives rise to uneasiness, is the case where an engineer is under the authority of a lay administrative officer. In such position the engineer is supposed to be the technical guide and adviser of his superior, or else he has a technical responsibility independent of his responsibility to his superior. When such a superior assumes to direct the recommendation or reported opinion of his engineering subordinate, is the latter justified in resisting such assumption, or is it proper for him to yield to the direction given and report or recommend as directed?

This is in no sense an abstract question. Cases can readily be cited, from the highest circles of our national government down to the smallest municipal administration in the country, or out of the affairs of many kinds of private corporations, to illustrate how this question arises and how in the ordinary working out of things it frequently leads to self-stultification on the part of the engineer and so in the long run exercises a debasing influence on the engineering profession. Further, the growing complexity of both governmental and corporation conditions gives the question steadily increasing importance. On these grounds a seriously considered answer is needed.

The Execution of a Contract

THE importance of having a carefully considered plan of execution adapted to and based upon the various requirements of the contract, as well as a number of other considerable factors in contracting, were the subject of some practical remarks given in a recent address by Mr. A. P. Greensfelder before the St. Louis Railway Club, an extract of which is given below:

"Having secured a contract, the next step is to outline a plan of execution. The old adage used to be, 'There are many wrong ways but only one right way of doing a thing.' Assuming a mind in every head, this adage would hardly seem fair. We are inclined to believe that there are as many ways of executing a job as there are contractors that figure it, each way probably as right as the other, having only in common the effort to avoid the wrong or unsafe way. In estimating a job it would seem logical that each contractor should, after sifting the problem, base his figures on some definite plan, sum up his items making the whole and arrive at his bidding price in the light of his own experience and judgment, irrespective of what he might think his competitor may bid or can do the work for.

"After the award it is only natural that concentrated thought and more detailed examination of the situation may modify the original scheme or alter it entirely. In fact, the noncontrollable factors frequently makes numerous modifications necessary, but the following of well-laid plans usually means successful fruition.

"Ten or fifteen-storey terminal buildings are erected to-day as easily as two-storey structures formerly. Long span bridges across navigable rivers are now warranted by increased business, repair and car shops of immense proportion are needed at numerous division points, coaling stations with automatic machinery are a modern necessity, while multitracking or rearrangement through rough country or congested city is complicated by caring for traffic. The building of such works presents interesting problems for solution which are being met by the introduction of modern labor-saving methods and machinery.

"We commonly hear the assertion that construction problems and methods to-day are not comparable to the building of the Egyptian Pyramids. It is possible that the pyramids could, if necessary, be as readily built upside down to-day with cranes and cableways at less cost and greater speed.

"Steam shovels, clam-shell buckets, cableways, pneumatic tools, concrete mixers, nitroglycerine and gasoline engines are among the numerous appliances devised to meet the requirements of the modern contractor. Labor-saving dvices are becoming annually more important where labor organizations or foreign labor are seeking greater pay and shorter hours to the possible neglect of quality of service. So necessary has an adequate plant become to a contractor that it requires large capital to purchase, maintain, transport and allow for depreciation of this machinery. So rapidly, too, are machines being improved and new ones being invented, that the life of an outfit is very short, in order to meet proper competition.

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*Contract Record, June 12, p. 41.

"One sometimes hears the criticism of inferior materials, but with the possible exception of timber, due to lack of forest conservation, this belief is not warranted. Modern shop machinery and industrial methods have kept pace with the times, and not only are materials of construction better, but what is even of greater importance are more uniform in composition, reliable in strength, and reduced in cost. Cement, pressed brick, tile, structural steel, and reinforcing bars have advanced standards to meet the needs of modern construction. Manganese and nickel steel, creosote and wire glass are new products in the commercial markets. Washed gravel, concrete piles, metal lath and steel ties involve processes adapted to new requirements. As for workmanship, the skill of specialized labor should be more efficient than that of a "Jack-of-all-trades," but the application of that skill is dependent upon the attitude of workmen individually or as a class.

"The magnitude of recent railroad developments involving expenditures of millions in place of thousands of dollars makes the element of time or speed of construction a very vital one. The interest charges on large investment compel rapid completion of building projects, and therefore introduce to an unusual degree not only large numbers of workmen and duplication of plant, but progression of work at all seasons of the year, in good weather or bad. This uncontrollable condition on the part of a contractor is probably one of the most vital and uncertain elements involving his financial success.

"Thus you can readily see how interwoven are the troubles of the contractor, who, in spite of good planning, proper tools and efficient supervision, may yet be overthrown by labor troubles, lack of control of material shipments or deliveries and weather conditions. It would seem to appeal only to men of tireless energy, optimistic faith in human endeavor and whose hands must not fear actual toil. Such fields hardly would appeal to those of 'get-rich-quick' calibre, common belief notwithstanding. Carlyle's trite saying, 'Labor est orare' (labor is worship) might be a motto of the contractor."

U. S. Cement Higher ?

AN upward trend in the U. S. cement market is predicted by the Engineering News. All the mills are in operation and stocks are reported decidedly lower than at this time last year. In fact not more than [illegible] per cent of the cement stored last year is now in hand. This, coupled with an improved demand and an outlook for better business looks as though somewhat higher prices may obtain later in the season. New York sales of Portland cement are being made at around $1.63 and slightly lower. Bags returned are credited at 40 cents, giving a price of 65 cents in bulk at the mill. At Boston, quotations are without change at $1.40, less 40 cents. Satisfaction is expressed in regard to conditions obtaining in the field for natural cement, for which quotations are [illegible] cents a barrel in New York and [illegible] in Boston.

Fair Wage Schedule at St. John, N. B.

The following is the Government fair wage schedule for the harbor improvements at Courtenay Bay, St. John, N.B., which the Norton Griffiths Company are carrying out at a contract price of $7,500,000: (1) per day of nine hours—foreman carpenter, $3.50; foreman mixing concrete, $2.50; foreman laying concrete, $3.50; foreman, stone crusher, $2.50; engineman for pile driver, $2.50; steam derrick engineer, $2.50; steam derrick fireman, $1.75; carpenters, $3.00; blacksmiths, $2.50; blacksmiths' helpers, $1.80. (2) per month with board, for ten-hour day—dredge runner, $125; dredge engineer, $125; dredge foreman, $45; scow men, $35; deck hands, $35; cook, $35; craneman, $85; tug captain, $70; tug engineer, $60; tug fireman, $45. (3) per day of 9 hours—steam drillers, $2.50; hand drillers, $2.00; powder man, $2.00; quarry man, $2.00; laborers, $1.75; driver, 1 horse and cart, $3.00; driver, 2 horses and wagon, $5.00; builders' laborers, $2.00. Divers with outfit receive $15 a day. Time and a half is paid for overtime, with double time on Sundays.

Proportions of Concrete for Monolithic Concrete Construction

The following proportions of mixture for plain or monolithic concrete construction were given by De Witt V. Moore in the course of a paper read before the Indiana Engineering Society:

It is usual to specify 1:2½:5 or 1:3:6 for the proportions of cement, sand, and gravel for plain or monolithic concrete work, and the usual specifications for reinforced concrete are 1 part cement, 2 parts sand, and 4 parts gravel, although some specify a richer mixture for columns. Inasmuch as there still exists a general ignorance on this point, whereby these specifications are understood as being 1:7½ or 1:9 or 1:6, respectively, it would seem that the best specifications should read that a mortar should be mixed of one part of cement to so many parts of sand, and this mortar should then be mixed with so many parts of the aggregate.

The ideal mixture of concrete assumes that the aggregate and mortar are mixed in such proportions that the most dense, solid, and homogeneous mass is secured. This result may be secured by expert engineering supervision; but in reality the good common sense of the expert concrete laborer may be depended upon. The artisan who is accustomed to handle concrete can determine, by the appearance of the concrete mixture, and by working the mixture, whether he is securing the best results, and after a long experience, the author is inclined to say that he would just as soon trust a practical common sense laborer's opinion as to base his work upon the report of a so-called expert engineer.

If a 1:2:6 mixture will satisfy the necessary strength required for construction, there is no necessity of specifying a 1:2:4 mixture, inasmuch as the first mixture will require approximately 1 bbl. per cubic yard, while the latter will require 1½ bbl.—a difference of at least [illegible] cents per cubic yard in actual cost. Many times, for footings and monolithic work 3/4 bbl. per cubic yard of concrete is all that is necessary. Why specify a rich mixture when one with a less amount of cement will answer the purpose? If a contractor is at all skilled in estimating, the extra cost will be included in his proposal.

Concrete Piles and Piling Equipment

Economy and Other Advantages of This Construction—Various Systems Discussed The Pre-Molded Pile and the Molded-in-Place Type[*]

By Maxwell M. Upson[†]

CONCRETE piling is a child of cheap cement. It was not until the late '90's (when the cost of cement began to decline) that the inventive minds of America and Europe turned their attention to the substitution of concrete for wood in this long used method of foundation construction.

It may not be too rash to predict that historians will refer to the period through which we are now passing as the "cement era." The marked improvement and economy in the manufacture of hydraulic or Portland cement, together with our present knowledge of how to combine it with steel has made it an economical substitute for almost all types of permanent building construction.

It is probable that as yet we have not more than passed within the gates of the field of usefulness of reinforced concrete. Although rapid strides have been made in the understanding of its theories of design, there is yet much to learn about its adaptability. Furthermore, there is a mental impedence or prejudice against the new or unprecedented, which takes years of experience and education to entirely remove. It is interesting in this particular to observe that, although Europeans (I speak now, particularly, of French, English, German and Italian Engineers) are more conservative than Americans in most engineering subjects, they have, nevertheless, shown themselves more enthusiastic in adopting, and more versatile in applying, reinforced concrete. While French and English railroads are building long-span bridges of built-up reinforced concrete trusses, certain large railroad corporations in this country have not even given recognition to reinforced concrete, or used monolithic concrete for other than heavy retaining walls and buttresses. Almost the same statement may be made concerning the use of reinforced concrete in wharf and bulkhead construction. Wharves in England, France, and Germany are largely constructed of reinforced concrete, while in this country the number of important structures of this character may be counted on the fingers of one's hands.

Concerning the use of concrete as a substitute for other materials, an interesting experience, recently observed, relates to the design and construction of a balustrade or railing for a pleasure pier. This pier was designed for reinforced concrete piles, capped with beam and slab construction; also of reinforced concrete. Naturally, the cost was somewhat in excess of a timber structure. On that account the owners specified that the railing should be of the cheapest possible design of galvanized iron pipe. It was found on careful comparison that an ornamental balustrade, made of concrete and steel, could be substituted for this pipe railing at a slightly less cost, and it was, therefore, adopted. This would seem to indicate that such decisions are often influenced by precedent rather than by actual facts.

Another interesting example, of large magnitude, is the substitution of a reinforced concrete bin, used in charging blast furnaces, for the standard steel hoppers which have been used for the last twenty-five years. In talking to the president of a large steel corporation, the writer suggested such a substitution on account of cost of maintenance and for the reason that the coke often ignites, thereby causing material damage in warping the plates and structural members. It was also suggested that the change might result in economy. After careful designs had been made for both steel and concrete it was found that the ratio of saving was approximately $66,000 against $100,000 per bin, i.e., a saving of 33 1/3 per cent., with a better structure and a lower maintenance.

Let us now consider the subject of concrete piling. There are two schools of concrete piling. The European or pre-molded reinforced concrete pile and the American or molded-in-place concrete pile. The theory of the European is that concrete should be treated simply as a substitute for wood, and that it should be pre-molded and reinforced so that it will withstand the handling and driving necessary to place it. The theory of the American is that the structure which is subjected to driving should be of steel or of some equally permanent and substantial material, to form a hole for the reception of the plastic concrete.

It does not seem necessary to treat at any length of the reinforced pre-molded type of pile, as it resolves itself merely into a problem of substituting reinforced concrete for wood or steel, and does not involve special equipment or special processes. The problem resulting from this type which has required the most ingenuity to solve, is the design of a cap or cushion that will protect the concrete from fracture during the process of driving. This is usually effected by placing hemp, sawdust, or some like substance in direct contact with the concrete, to distribute the effect of the blow, thereby avoiding fracture through concentration of the impact on a small area. For this purpose one inventor has devised an air cushion, which is said to be satisfactory. One notable disadvantage in the use of heavy cushions of this character is that it practically precludes determining the carrying capacity of piles through observation of their penetration during the final driving.

The pre-molded type of pile, however, has a wide field, particularly in water work or foundation construction in which the pile projects above the ground and is consequently subjected to lateral strains.

The molded-in-place type of pile, which is essentially a foundation or weight-carrying pile, may be divided into two classes:

1. The pile which is formed by (a) driving collapsible steel mandrel encased in a sheet-steel shell; (b) withdrawing the mandrel, after sufficient penetration has been secured, leaving the sheet-steel shell in the ground to serve as a mold or form, and (c) filling this with plastic concrete. This is known as the "Raymond System."

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[*] Extract of paper delivered before the American Society of Engineering Contractors.

[†] General Manager, Raymond Concrete Pile Company, New York, N.Y.

2. The pile which is formed by (a) driving a pipe having a cap or protective point, (b) filling the pipe, after sufficient penetration has been secured, and (c) withdrawing the pipe in a manner that will allow the concrete to fill the hole which is left by the withdrawal. This is known as the "Simplex System."

All types of made-in-place piling are based on these two principles.

The Raymond System was the first to be developed and patented in this country. The inventor, Alfred A. Raymond, was a bridge builder and a practical pile-driving man. While engaged in building new work and repairing bridges in Kansas and Nebraska for the Union Pacific and Burlington Railroads during the late '90's, he was impressed with the short life of timber piles used in the construction of trestles. It was in an attempt to secure a sub-structure permanency equivalent to that of masonry superstructure that he devised the Raymond System of concrete piling. The first piles of this type used were driven by Mr. Raymond in the foundation of a Chicago apartment house in 1901. This work caused considerable comment in the engineering world, but it was the general opinion that the field for concrete piling was exceedingly limited and that the business would, therefore, never develop into one of great magnitude. On that account it was some years before Mr. Raymond was able to enlist sufficient capital to adequately promote his ideas.

In 1903, on account of the inability of Mr. Raymond to bid on the foundations for the Connecticut Apartment House, in Washington, owned by the late John Hay, local Washington contractor, devised a means of placing concrete piles, which later resulted in what is known as the "Simplex System." Just who was the real inventor is a much mooted question. Interference suits in the United States Patent Office have been under adjudication for the past six or eight years. It is now understood that the courts have awarded the invention to Mr. Richard J. Beal, although Mr. Frank Shuman, who is President of the Simplex Concrete Pile Company, had heretofore been known as the inventor.

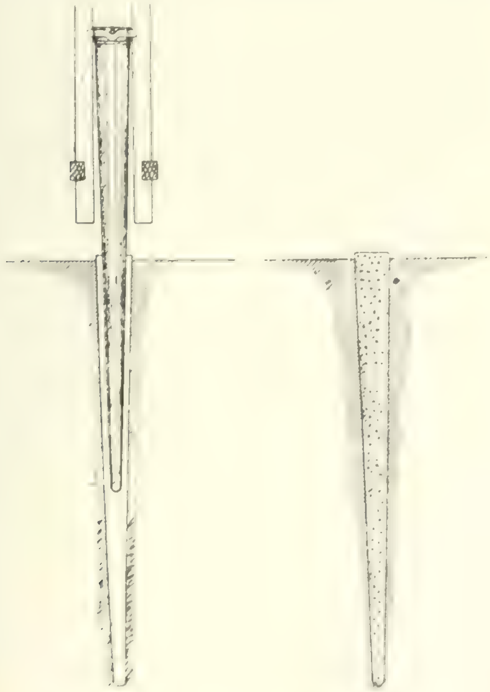


Fig 1.—"Raymond" pile core collapsed and partly withdrawn from shell. Completed "Raymond" pile without reinforcement.

In order to illustrate the two systems more in detail, drawings outlining the principles of each are shown. Fig. 1 represents the Raymond System. It will be noted that the collapsible mandrel has been removed from the steel-lined hole. The shell serves the double purpose of preventing the admixture of water or liquid material with the concrete, and of maintaining the shape and size of the core so that the hole can be carefully inspected before the concrete is placed. This is better illustrated by a photographic reproduction of the actual apparatus shown in Fig. 2.

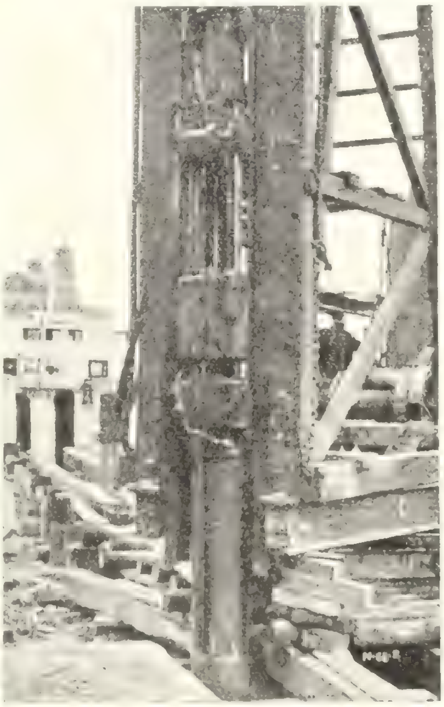


Fig. 2 Shell of "Raymond" pile driven to refusal and core about to be withdrawn.

It should be observed that the cores or collapsible mandrels are built with a substantial taper. Mr. Raymond found in his wooden pile work that there seemed to be a marked advantage in the carrying capacity of the pile which had the greater taper. On that account he designed his first cores with a taper materially in excess of anything that may be found in the natural growth of timber. It is interesting to know that this observation has been demonstrated correct, both theoretically and practically, to a degree not appreciated at the time of its adoption.

The shell is made of sheet steel of a thickness depending on the elasticity and crushing tendency of the earth. The sections are approximately 8 feet long, telescoping into each other from 9 to 18 inches. On the end of the core or mandrel is placed a boot made of pressed steel. This is of heavier material and is designed to withstand the cutting effect of rock and other obstructions which are encountered in driving. The core is expanded and dressed with the steel shell and boot, then it is dropped into place and driven by means of a steam hammer. When the desired penetration is secured the core is collapsed and withdrawn; the shell is then inspected, to see that a perfect hole has been securd, and is afterwards filled with concrete.

Fig. 3 represents the general principles of the Simplex System. A pipe, closed at its lower end by a cap or point of slightly larger diameter, is driven into the ground until sufficient resistance is obtained; the interior is then either partially or entirely filled with concrete and the pipe immediately withdrawn, so that the plastic concrete will fill the opening formed in driving. Another method of attaining the same end, illustrated by Fig. 4, makes use of an "alligator" point, instead of the metal cap or point previously shown. The method is practically the same, except that the pipe is raised slightly, prior to filling the hole with concrete, and a heavy weight is dropped into the interior to force the "alligator" jaws open, so that concrete may pass to the hole beyond.

Two other methods of accomplishing practically the same end have been devised by other inventors. One of these, known as the "Abbott" or "Pedestal" Pile, was invented by Mr. Hunley Abbott. This consists of driving a pipe or casing having an interior core which projects several feet below its end. The theory of this pile is that penetration is secured to a hard-pan or substantial stratum, upon which rests the point of the core. The enlargement at the base of the pile is formed by running the concrete into the opening left by the removal of projecting core before the pipe itself is pulled up. The method of filling and withdrawing the pipe, after the base has been formed, is similar to that of the Simplex System.

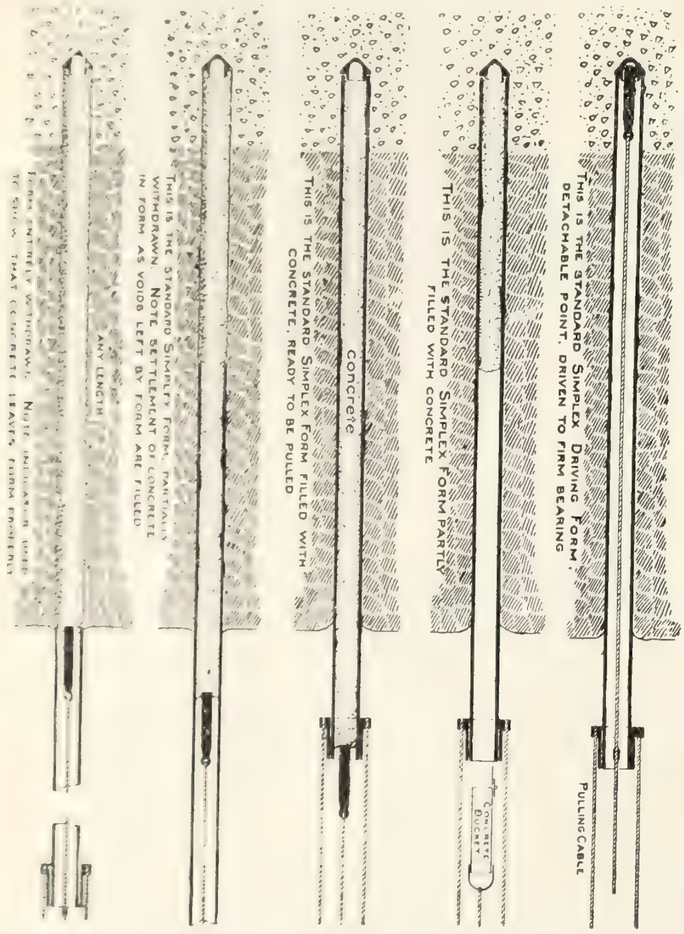

Form entirely withdrawn. Note indicator used to show that concrete leaves form properly
Any length
This is the standard Simplex form, partially withdrawn. Note settlement of concrete in form as voids left by form are filled
Concrete
This is the standard Simplex form filled with concrete, ready to be pulled
This is the standard Simplex form partly filled with concrete
Concrete bucket
This is the standard Simplex driving form, detachable point, driven to firm bearing
Pulling cable

Fig. 3—"Simplex" system of concrete piling. Detachable point.

It was not until concrete piling had been used for several years that engineers began to appreciate its real economies. It is a long recognized principle that timber foundation piles are permanent only when cut off below permanent ground water level. On that account it is necessary to carry the masonry foundation down to such a level. This involves deep excavations, expensive sheeting, shoring and pumping, and a costly and heavy masonry substructure from the top of the piling to the superstructure.

With concrete piling the water level may be entirely ignored, thereby permitting pile foundations to begin at any other level. It will no doubt be a surprise to some engineers to learn that not infrequently bids on a complete foundation structure show a saving of as much as fifty per cent. in favor of the concrete pile construction as compared with timber.

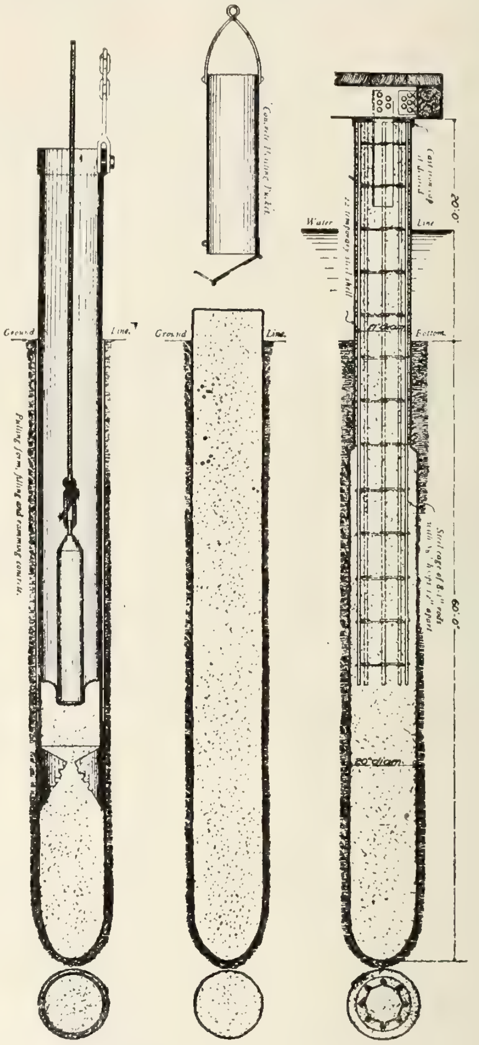


Fig. 4—"Simplex" system of concrete piling. "Alligator" point.

Fig. 5 illustrates typical designs of timber pile and concrete pile foundation where the floor level is ten feet above water line. Under normal conditions it is found that there is economy in using concrete piles where this difference in level is more than four or five feet. This, however, is not without exceptions, since the magnitude of the load to be carried has an important bearing on the economy. Fifty thousand dollars was recently saved on the construction of the foundation for a large power station by the use of concrete piles where the cut-off was within two feet of low tide.

Another advantage in the use of concrete piles, particularly where heavy loads occur, is in their increased carrying capacity over the timber piles. This is largely due to the size and taper of the former. Furthermore, for the foregoing reasons, concrete piling is, under the same conditions, much shorter than timber piling, so that the comparative cost per linear foot is misleading. It is an established custom among engineers to restrict the loading of timber piles within the range from 12 to 20 tons, while concrete piles may be loaded from 25 to 40 tons with even a greater factor of safety. It will be readily appreciated that the increase in the carrying capacity of the concrete pile in heavily loaded piers makes it possible to reduce materially the size of the piers. As shown in Fig. 5 twenty-five timber piles, each loaded to 15 tons, are required for this pier, while, with the same total load, only eleven concrete piles, loaded to 30 tons, are required. This means decreased excavation, decreased concrete and steel, decreased weight, both of masonry and backfill—all of which have a material effect on the cost.

Comparisons of this kind are sometimes misleading, particularly on account of the assumed cost of unit quantities. The desire of the contractor is to eliminate the quantities that are uncertain. In foundation work, shoring, pumping, and excavating are the most difficult costs to estimate. On that account, and for the reason that it is difficult to approximate the time required to execute the work, the experienced contractor is glad to substitute a construction which reduces or eliminates these uncertainties. Examination of Fig. 5 shows that the size of the footing on concrete piles is smaller than that on the timber piles. This is because each timber pile is carrying about half the load placed on each concrete pile.

For some years engineers were reluctant to allow concrete piling a loading of 30 to 35 tons, and it has been only through a large number of tests and a wide range of experiments that they have been finally convinced that it is good engineering practice.

Another situation which has brought the concrete pile favorable consideration on the part of engineers, is the advent of subways and the lowering of sewers in cities. These have had a material effect on the heretofore permanent water level, resulting in many instances in expensive changes and repairs on structures supported by timber piling. A notable instance of this character is observed in the Criminal Courts Building of New York City, which promises to result in complete rebuilding on account of the damage caused by failure of the piling due to draining of the soil by adjacent subways.

The advantages of the concrete pile are readily appreciated in salt water work where the Teredo and Limnoria exist. This includes practically all the United States Coast, except in harbors where the pollution by sewage exterminates these forms of animal life. It has been found in many locations that it is utterly impossible to use either creosoted or protected wood in permanent structures, on account of the action of these enemies.

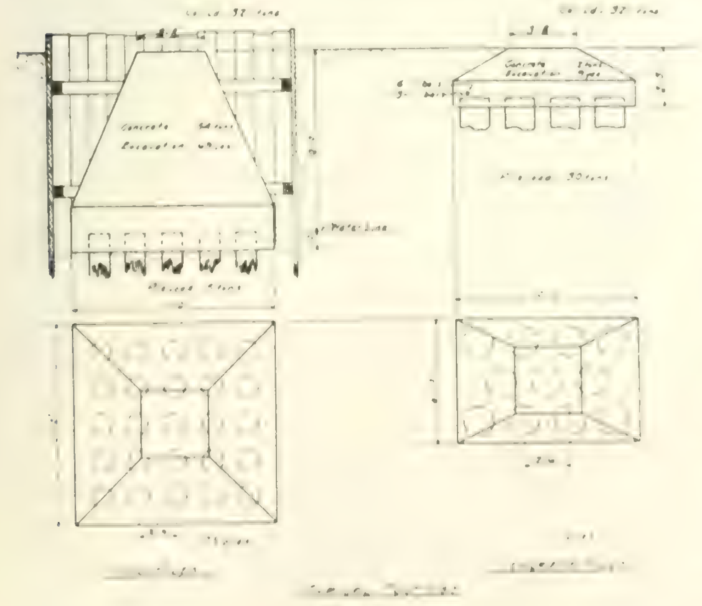


Fig. 5

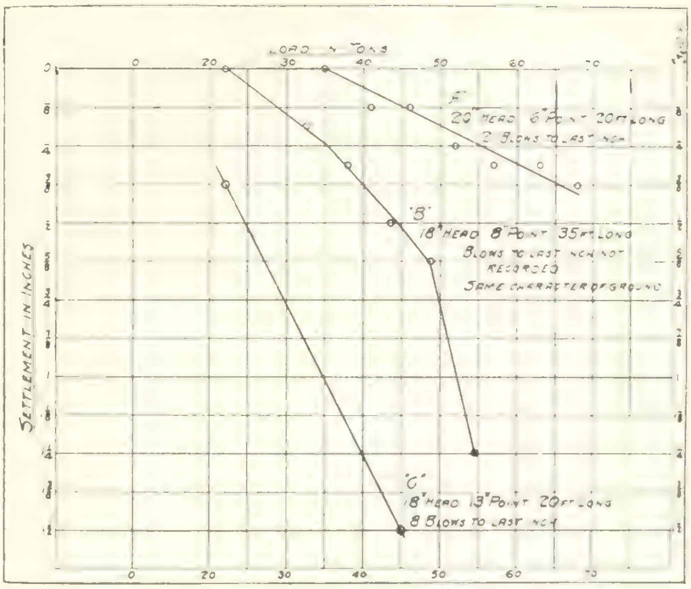


Fig. 6—Diagram of tests made to determine carrying capacity of tapered piles.

The obvious reason for the increased load lies in the larger area of concrete piles as compared with timber piles, particularly when comparison is made with the timber piling that is available in recent years. The depletion of our forests has made a marked difference, both in the cost and in the quality of the timber supplied for piling purposes. It is now difficult to get piles only as long as forty feet with a butt that will measure more than twelve inches in diameter. This 12-inch butt compared with the 20-inch butt of a Raymond Pile indicates a ratio of area of about one to two. Since the carrying capacity of the pile depends on the frictional surface and the strength of the pile unit itself, it is obvious that the loading may be increased as these quantities increase. It will be shown later that the volume of a unit of frictional area is greater with concrete than with timber piles. On the other hand, it must be borne in mind that the safe allowable unit value of compression for concrete is not as high as that of timber. In practice, however, the determination of the loading of a pile depends more often on the carrying capacity of the ground than on the strength of the pile itself. In scores of tests which have come under the observation of the writer there has never been a loading carried to a degree sufficient to show any weakness in the structure of the pile itself, although reports have been made of certain tests where evidence of failure on the part of the concrete has been disclosed. This is explained in several different ways and is too involved and not of sufficient importance to merit further discussion.

It has been stated above that the carrying capacity of the pile depends on the frictional area. This statement means not only the quantity [illegible] but also the relationship of this area to the surrounding ground. It is only recently that engineers have been able to prove this positively. To illustrate this point there is shown a diagram (Fig. 6) of tests made by a prominent Boston engineer to demonstrate the increased carrying capacity of a heavily tapered pile as against a slightly tapered or practically straight pile. It will be observed that the abscissae show the loading in tons, the ordinates, the settlements in inches. These three piles were each driven by a No. 2 Vulcan steam hammer within 15 or 20 feet of each other.

Pile A had a 20-inch head and a 6-inch point, and was 20 feet long.

Pile B had an 18-inch head and 8-inch point, and was 35 feet long.

Pile C had an 18-inch head and 13-inch point, and was 20 feet long.

It will be observed that Pile A with the extreme taper brought up with a resistance of 21 blows to the last inch, requiring about 875 blows for complete driving.

The number of blows required to drive Pile B was not recorded. The final penetration was 8 blows to the last inch. The taper of Pile B approaches that of the ordinary timber piling.

Pile C was driven with 944 blows to a final penetration of 8 blows to the last inch.

The curves record the carrying capacity of the various piles. The Type A pile shows no settlement up to 35 tons and only 3/8 inch at 70 tons. Pile B began to settle at 22 tons and failed at a little over 45 tons. Pile C began to show settlement at once and failed completely under about 25 to 30 tons.

All of these test piles were driven in uniform clay in which no hard-pan or rock was encountered. It is evident from the above that the actual surface of the pile under conditions of this character is not so important as the manner in which this surface is presented to the earth.

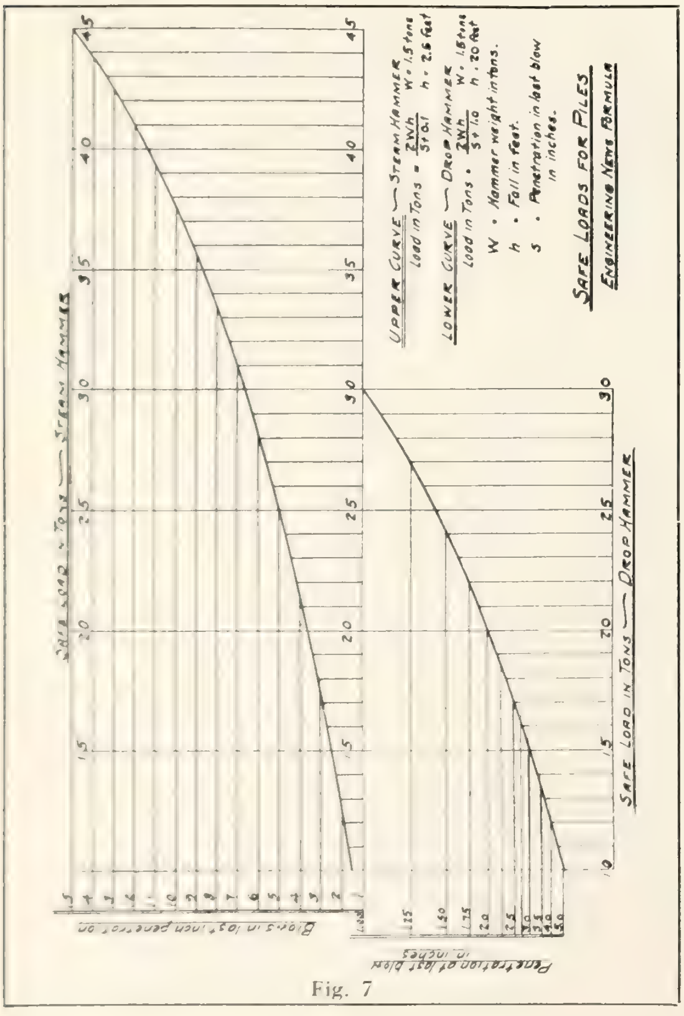


Fig. 7

The practical pile man realizes that the type of pile to use depends upon the character of the soil and underlying strata. It is obvious that a pile that carries to rock or hard-pan, through intervening material having no great bearing capacity, should be practically straight, so that a large area will be presented to the underlying substantial stratum. It is under these conditions that the pile with the enlarged point would seem to have its field. On the other hand the idea of putting an enlarged point on the end of a pile which does not reach a firm bearing seems in direct variance with the principle of piling, since the compression of the soil caused by enlarging the point necessarily has lifting components as well as horizontal and downward components. This tends to offset the weight of the upper soil thereby vitiating the frictional efficiency of the pile column.

In discussing the advantages of tapered piles as against piles of uniform cross-section, an important commercial principle should receive consideration. The writer finds that in driving in uniform soil, a straight core or one having a very slight taper, can be driven to almost any desired penetration, while a core with extreme taper brings up to practical refusal at comparatively short lengths. Now, it is obvious to the practical engineer that the cost of piling per foot depends very largely on the length of the pile which is driven. That is, there are certain fixed charges which accrue per pile independent of its length. Therefore, it follows that a price of 75 cents a foot for piles 35 to 45 feet long, is much more profitable than a price of $1.00 to $1.25 a foot for piles 15 to 25 feet long. This fact makes it possible for many contractors who use a pile of uniform cross-section to quote a low unit price, basing their information on the knowledge that they will be able to drive piles materially longer than the assumed length.

Consequently, it should be thoroughly understood by prospective users of piles that the cost per lineal foot does not in itself convey any knowledge of the ultimate cost of the work, unless the shape of the pile former is taken into account, or that the penetration is limited by an underlying strata of rock or hard-pan.

It has been intimated previously that the safe carrying capacity of a pile depends chiefly on the character of the soil into which it is driven. This fact is so true that it is practically impossible to make any empirical rules governing the allowable surface friction, and, consequently, the penetration necessary to carry a specific load. Fortunately, the formula known as the "Engineering News Formula" usually supplies the information necessary to pre-determine the safe loading of the pile. It is here shown in Fig. 7.

The placing of the piles resolves itself into three important operations:

1st—The driving of the pile core or tube to a resistance sufficient to carry the desired load.

2nd—The maintaining of the hole and the sustaining of the initial pressure between the pile and the surrounding earth.

3rd—The protection of the pile while the concrete is setting, from distortion caused by driving adjacent piles or from the admixture of water, silt, quicksand, etc.

The piles are driven by means of the ordinary steam hammer. This consists of a heavy weight attached to the vertical piston rod of a single acting steam cylinder. The hammer is raised by steam and

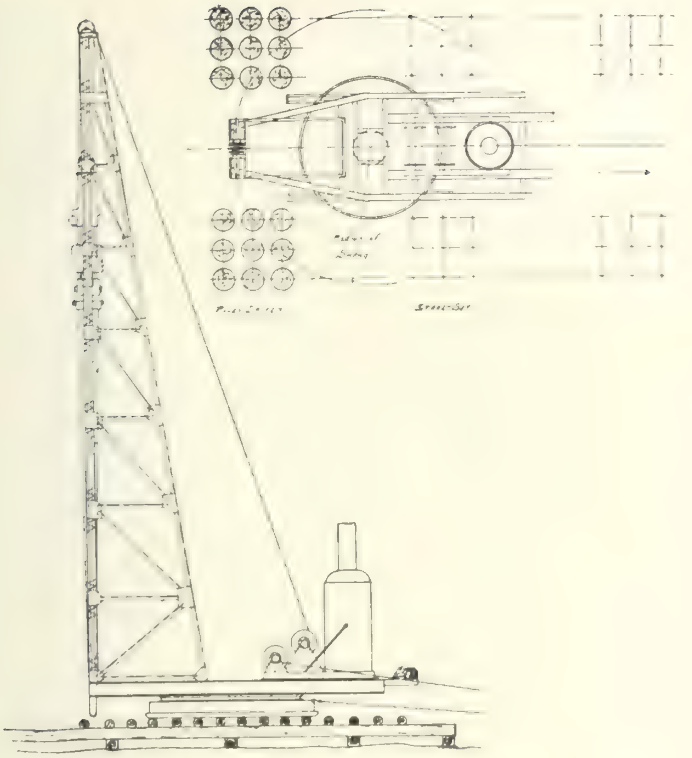


Fig. 8—Plan and elevation of standard "Raymond" pile driver mounted on turntable.

drops through the action of gravity. Several hammers are now on the market which use steam to increase the impact. As yet, however, the writer has not found them successful in the driving of piles of large mass.

Fig. 8 shows a typical Raymond driving outfit. It has been found that steel leads are stiffer, lighter for the same strength and more durable than those made of wood. On that account they are being adopted now as a standard construction. The leads and engine are on a turn-table which rests on what is termed a "bed-sill." This bed-sill travels on rollers laid on timber runways. The driver travels between two lines of piers and swings from side to side to drive the piles. A standard two-drum hoisting engine operates the pile line and raises or lowers the core and hammer. Before driving each pile the core must be dressed with a new shell. These shells are made in 8-foot sections, usually of No. 18 or No. 20 gauge sheet steel. They are made on the field by means of a standard cornice brake and are jointed together longitudinally by using a typical tinner's seam. These sections are pulled on to the core tightly, so that they form a complete covering, each section lapping from 9 to 18 inches over the adjacent section. When the core is completely dressed, a pressed steel boot is placed over the point. The driver may then be swung into position and driving begun.

There has been much discussion about the action of salt water on concrete and the technical papers are still giving space to writers on this subject.

Very notable failures of concrete subjected to the action of salt water have made engineers slow to adopt this material in sea water construction. It is found in practically all instances that this deterioration occurs between high and low water, thus indicating that the effect of alternately exposing the concrete to the action of the air and of the water has something to do with the disintegration. Engineers are now coming to the opinion that this deterioration is due to the effect of salt water on the concrete during the time of setting, i.e., that the alternate saturation and oxidation by the air materially impairs the life of the concrete. This is especially noticed in cold countries where frost occurs. One theory is that concrete which is subjected to alternate saturation and drying during the process of setting must necessarily be more or less porous. Due to the excess of water, small interstices are formed in the concrete during the high tide. Later the water in these openings freezes on being subjected to the cold atmosphere. The expansion caused by the frost disintegrates the concrete and affords an opportunity for the next succeeding tide to penetrate farther in from the surface. In localities where frost is not a factor, the porous concrete produces the same results by subjecting the entire mass to the action of the chemicals of the water. It is now the general opinion of engineers who have undertaken to investigate this matter carefully that concrete properly mixed and placed so as to form a dense mass which is then thoroughly cured before being submerged, will withstand permanently the action of the chlorines and other constituents of sea water. It is important that the cement used should be low in magnesia and anhydrous sulphuric acid.

A unique method of accomplishing permanent sheet-piling work is shown in Fig. 9. This is known as the reinforced concrete steel interlocking sheet-pile. It was patented by the writer some years ago as a means of making an absolutely tight wall to retain silt or quicksand below the water line. It consists of a concrete pile reinforced to meet the load to which it is subjected. In the sides of each pile are embedded the two members of a light weight steel sheet-piling. These are tied together at certain intervals by steel rods. Their function is to securely lock the pile together until the semi-circular recesses on either side may be freed from mud with a stream of water and filled with cement mortar by means of an ordinary grouting machine. There are many applications for this type of sheet-piling, particularly in bulkhead, for curtain walls underneath dams, or in building caissons to solid material in river or harbor bottoms; it has all the advantages of steel sheet-piling together with the increased later strength and permanency of reinforced concrete.

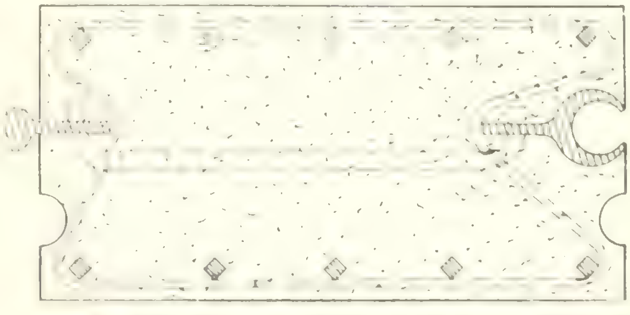


Fig. 9—Cross-section of interlocking reinforced concrete sheet-piling.

It has been unfortunate for those who are interested in the advancement of concrete piles, that some of the people engaged in this class of work, following their desire to operate cheaply, have placed piles in soft soil without protecting the concrete from the admixture of water, silt, etc. Furthermore, they have driven piles adjacent to the unprotected green concrete previously placed in the ground, in a manner that has caused the intervening earth to distort and cut these green piles in pieces. Such work has naturally resulted in settlement and grave foundation difficulties, all of which have had a disastrous effect on the adoption of concrete piling by conservative engineers. It must be said without prejudice to any particular type of pile that certain fundamental principles underly the placing of concrete in the ground in a manner to assure satisfactory results and to secure the support of the superimposed load. It is, therefore, important that engineers carefully study the various systems of concrete piling in detail before they are able to determine the type of pile that can safely be used in foundation work.

Methods of Depositing Concrete Under Water

This was one of the subjects reported upon by the Committee on Masonry at the annual meeting of the American Railway Engineering Association. The replies to a circular letter of inquiry covered nine methods, as follows: 1, bottom-dump bucket; 2, tremie (or closed chute); 3, open chutes; 4, sacks; 5, sacks withdrawn; 6, paper bags; 7, open depositing; 8, pneumatic grouting of broken stone; 9, concrete blocks. From an examination of the replies the committee has drawn the following conclusions:

1. Concrete may be deposited successfully under water, is so handled as to prevent the washing of the cement from the mixture.

2. Cofferdams should be sufficiently tight to prevent current through the pit, and the water in the pit should be quiet.

3. The concrete should be deposited in place either by means of a drop-bottom bucket or a tremie, and should not be allowed to fall through the water.

4. Where a bucket is used, it should be carefully lowered to the bottom and raised to the surface, so as to cause as little disturbance as possible.

5. Where a tremie is used, it should be kept filled with concrete up to the top of the water level; the discharge end should be kept buried in the freshly deposited mass to prevent emptying, and raised a few inches at a time as the filling progresses.

6. The surface of the concrete must be kept as nearly level as possible, to avoid the formation of pockets which will retain laitance and sediment.

7. Where concrete is not deposited continuously, all sediment should be removed from the surface of the concrete, by pumping or otherwise, before depositing fresh concrete.

8. The concrete should be a 1:2:4 mixture and of a "quaking" consistency.

9. Freshly deposited concrete should not be disturbed.

10. In open water or where flow of water through the pit cannot be prevented, concrete should be deposited in cloth sacks.

Temperature in Concrete Arches

Temperatures in concrete arches have been so problematical that the experiments in progress in Iowa deserve more attention than they have received generally. They were begun in 1909 on a 45-ft. span at Ames, in which six mercury thermometers were inserted so that their bulbs were at distances from the surface ranging from 2 ft. 9 in. at the piers to 5 in. at the crown. The following year Thwing electric thermometers were bedded beside the mercury instruments and check readings have been obtained since then. In addition a number of reference marks were fixed on the bridge and the change in shape of the arch ring due to changes in temperature is being measured. Last year nine electric thermometers were inserted in the Walnut street bridge at Des Moines, recently described in this journal, and readings of them are now being taken daily. At the same time readings are made of the length of a 3 ft. block of concrete 6 in. square molded from the mix used in the bridge. The results of these measurements are not yet worked up, but Messrs. C. S. Nichols and C. B. McCullough, who have the investigation in hand, have given out some surprising comments on what has been learned up to the present time. In the case of the Ames bridge, for instance, the bending moment at the crown due to a temperature variation of 40 deg. was found to be 2.06 times that for the dead load and 1.23 times that for the dead load at the springing line. In applying the information gained in this way to practical work, it has been found that the shape of the arch ring has an astonishing influence on the amount of the temperature stresses. Four arches of 50 ft. span and 5 ft. rise were first analyzed; one had a transformed catenary for both extrados and intrados, and the others had a circular, elliptical and parabolic curve respectively for the intrados, the moment of inertia at each point being equal to the moment of inertia of the catenarian arch. Then the analysis was repeated with arches of the same span but 10 ft. rise. A comparison of the results showed that in the former case the compression at the crown of the elliptic arch due to temperature changes was about three times that in the arch with greater rise. This was the worst case of all, it is true, but the whole series of analyses was so conclusive on the subject, says the Engineering Record, that Messrs. Nichols and McCullough have strongly advised great care in designing very flat arches, such as are used in parks, going so far as to suggest reinforcing them as slabs and permitting enough expansion to ensure freedom from any arch action.

A Cylindrical Reinforced Concrete Foundation

A reinforced concrete caisson serving an unusual purpose has recently been built at the Portland cement works of Messrs. Casebourne & Company on Haverton Hill-on-Tees, England. The caisson, which is 18 ft. 6 in. in diameter and 22 ft. deep, is designed to provide a water tight underground chamber for machinery and also to serve as a foundation wall for an additional building to be erected on the site. The ground in the locality is saturated with water to within about 18 in. of the surface, thus rendering ordinary methods of construction impracticable.

For this reason the consulting engineers on the work, Messrs. L. G. Mouchel and partners, recommended the use of a series of cylinder rings of reinforced concrete, each 12 in. deep, and designed according to the Hennebique system. The rings were 6 in. thick and the lower one was molded with a cutting edge to facilitate sinking. They were joined by means of an annular keyway or groove with a trapezoidal section 3 in. wide by 1 in. deep placed in the top surface, into which a projecting tongue on the ring above fitted. A water tight joint was secured by grouting with cement mortar and steel stirrups with splid ends were inserted into recesses molded on the inner surface of the rings on each side of the joint and grouted in place, thus providing additional security.

The reinforcement of the rings consisted of four annular rods, tied together horizontally and vertically with steel links of a type similar to those employed in Hennebique columns. Across the top of this caisson are two reinforced concrete beams supporting a standard gauge railroad track. These beams are 14 in. deep and are heavily reinforced with horizontal rods and vertical stirrups and this reinforcement is carried into the upper sections of the caisson walls, which are also stiffened locally with concrete brackets or knee braces built monolithic with the other parts of the construction.

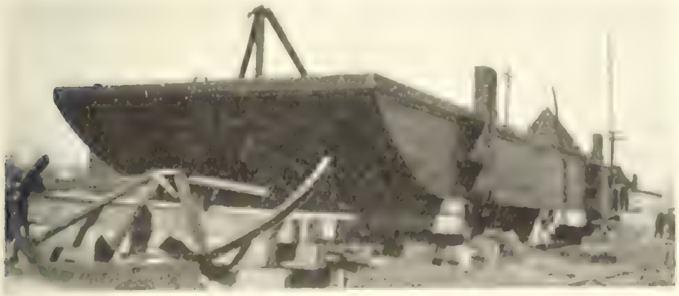
The removal of the material inside of the rings was accomplished with the aid of ordinary grab buckets. As the work progressed additional rings were added until the cutting edge of the lower one was 22 ft. below the surface of the ground. The final operation was to close the caisson with reinforced concrete floor 10 in. thick. This floor was reinforced with an independent system of rods, strengthening it against hydrostatic pressure, and the bevel of the cutting edge of the lowest ring provided a means of receiving a tight joint.

According to a recent issue of "Engineering," from which the above notes are abstracted, experiments conducted while the work was under way showed a high load bearing capacity of the caisson and the satisfactory fact that the resulting pressure on the soil was very small.

A Special Type of Contractor's Scow

The scows shown in the accompanying photographs were built of British Columbia fir and were used by Messrs. Roger Miller & Sons, contractors, in the work of laying the intake pipe for the city of Toronto.

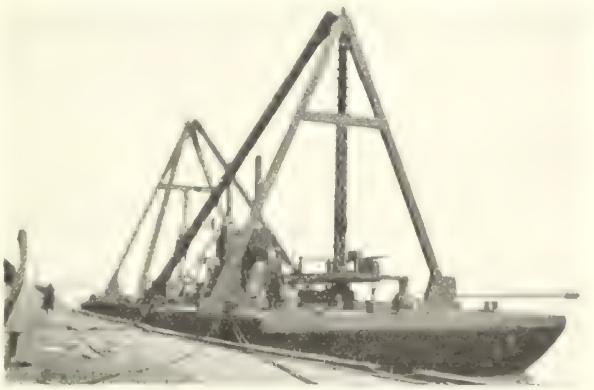
These scows are 100 feet long, 30 feet wide and 8 feet deep. The largest timbers used are the outside kelsons, which are 16 in. x 17 in. x 72 feet. In shipping these timbers from the coast to Toronto it was necessary to place them upon two flat cars on account of their great length. The side planks are also unusually large timbers, being 5 in. thick, 21 in. wide and some of them 60 feet long. An interesting feature of these scows is the fact that they each have two bulkheads at the sides. The timbers used for the bulkhead walls are 5 in. thick and run the whole length of the scows. By the use of valves placed in the side of the scow to admit water it is possible to dump the scows from either side. This is an extremely valuable feature, making it possible to dump heavy loads of rock at any desired spot at a trifling cost. The bulkheads are emptied by a pump after the dumping process has been completed.



Scow under construction

Another interesting feature in the construction of the scows is that each has three sets of two wells formed of 8-in. pipe. Two wells are placed in the centre and two others at each side of the scow. These wells extend from the top to the bottom of the scow and through them chains are passed which can be drawn up around the sections of intake pipe which are thus carried to the place where they are to be laid. The pipes can be lowered to their position with ease.

Another interesting feature in which long British Columbia timbers come into play, is the provision which is made for propping the scows on bottom when it is necessary to do any heavy lifting. Two spud guides have been placed on one side of the scows and spuds consisting of 38-ft. timbers are lowered through them and allowed to rest upon the bottom of the lake while the lifting operations are in progress. By this means good leverage is secured.



The completed scow

In the construction of the scows all the boring and driving was done by compressed air as in most cases the awkward position and lack of light made it practically impossible to use anything in the nature of a hammer or hand drill.

One of the scows is provided with two derricks, each of 20-ton capacity with clam shells for digging. The booms for the derricks are 14 in. x 16 in. x 65 ft. These derricks will be used for digging the trenches in which the pipes will be laid. The other scow will have a steel derrick of 20-ton capacity, which will be used for laying the pipes. The pipes are each 66 feet long and 6 feet in diameter and weigh 50 tons.

Neilson Building Collapse*

The finding of the jury in the Neilson building inquest was announced last week and is given below:

"It is the opinion of this jury that the collapse of the south wall of the Neilson building was due to a combination of circumstances: first, vibration caused by the working of the gin-wheel, bricklayers' hoist, derrick and machinery in the occupied portion of the building (retarding the setting of the mortar); second, the strain caused by the hauling up of all material over the south wall while in a green state; third, the green wall had the load upon it before the mortar had had time to set; fourth, the above, combined with a possible cause, such as a jar or shock which the wall may have received while in a green state.

"We are further of the opinion that walls of this height and length should be built of pier construction; second, that in the construction of a building of this type a temporary tie should be used while under construction; third, that buildings of this dimension should be more frequently inspected; fourth, we would also suggest that cement be used for rapid construction."

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*For previous references see Contract Record, May [illegible], p. [illegible]; May [illegible], pp. [illegible] and [illegible]

Railroad Work on the Algoma Central

Building toward Hudson Bay from the Sault across Three Transcontinental Roads—Heavy Bridging and Difficult Location

By R. S. McCormick, Chief Engineer

THE construction of the Algoma Central & Hudson Bay Railway was originally begun in the spring of 1900 by the old Lake Superior Corporation, under the management of Mr. F. H. Clergue, and a land grant and subsidy was arranged for at that time with the Dominion Government. The work of construction was carried on until the spring of 1903, at which time there was graded a continuous line from Sault Ste. Marie, Ont., to a connection at Josephine Junction, 170½ miles north, with a line extending down to Lake Superior, at Michipicoten Harbor. This section, 20 miles long, was built in 1899-1900 to gain access to valuable iron mines in this territory, owned by the corporation.

The grading work on the main line was not completely finished, however, as financial misfortunes overtook the corporation and track was only laid to a point about 55 miles north of the "Soo." A large number of bridges and trestles between this point and Josephine Junction were also not built but otherwise the line was completed to subgrade. Between the years 1903 and 1908, additional track was laid to bring the end of steel to Mile 68. No other work was done north of this point.

In 1909, active measures were begun to complete the Algoma Central by an English syndicate, which had in the meantime secured control of the Lake Superior Corporation, including the Algoma Steel Company, the railroad and other transportation and industrial interests at Sault Ste. Marie. Before undertaking the completion and proposed extensions of the railway, a report was made for the management on the whole project by Mr. F. H. McGuigan, of Toronto. Mr. McGuigan reported favorably on the completion of the line and its extension to connect with the National Transcontinental Railway.

The Hawk Lake-Hobon Section

The necessary financial arrangements being successfully completed, the first work undertaken was the locating of a line to connect the old grade near Hawk Lake with the Canadian Pacific Railway. This was accomplished by the location and construction of 30 miles of line from Hawk Lake Junction to Hobon on the Canadian Pacific Railway. Mr. S. Keemle, locating engineer, Toronto, was in charge of the locating party on this work. A 0.6-per-cent. compensated line with 6-deg. maximum curve was secured at a cost of about $38,000 per mile complete, including track and structures.

In May, 1910, a contract was let to the O'Boyle Bros. Construction Company, of Sault Ste. Marie, Ont., for this section, and on July 1, another contract to the same contractors for the completion of the main line from Mile 68 to Josephine Junction, at Mile 170½, including re-grading at points where cuttings had slid in, bringing up settled embankments, all the bridging, excepting at Montreal River, track-laying and ballasting.

In the meantime a spur of 9½ miles was located from a point 17 miles from Michipicoten Harbor, on the line extending from the lake to the mines, northerly to a new iron mine known as the Magpie mine. This construction, including track-laying and ballasting, was also contracted to the O'Boyle Bros., and in May, 1910, active work was started.

The railroad company also started work to repair and re-tie that section of the twenty miles extending from the harbor to Josephine Junction, known as the Josephine Branch, this being the upper ten miles of the line which had been wholly unused for over eight years. It was in wretched shape, as the ties were rotten, and since very little ballast was originally put on when first constructed, it was necessary to re-ballast the whole section. The railway company did this work with its own forces, with some help from the O'Boyle Company.

Progress in the First Year

From May, 1910, to August, 1911, the work on the main line, north from Mile 68 and south from Josephine Junction, the grading of the Hawk Lake-Hobon section, the building of the Magpie branch and the rebuilding of the ten miles of the Josephine branch, proceeded with the usual ups and downs peculiar to railroad constuction work in such a country. Poor labor, generally a lack of it, bush fires, whiskey and all the troubles incident thereto, known only to the experienced, were faced and fought. By August 1, 1911, the Magpie branch was completed, at a cost of practically $275,000. The line was built on a 1.5-per-cent compensated grade against the traffic and 2.5-per-cent flat with the traffic.

The first 4½ miles to the crossing of the Magpie River was light work except for some heavy side cutting descending the slope to cross the river, at which point the adverse grade of 1.5 per cent, compensated, was located. From the river crossing to the mine the line is heavy, and at Mile 7½ there is a timber trestle 900 feet long and 80 feet high, on a 12-deg. curve and a 1.75-per cent grade. Up to this point the grade is 2 per cent maximum and from here to the mine site it is 2½ per cent, 12 deg. being the maximum curve. Very large expenditures are being made by the company in opening the mine, and in addition to a plant for treating the siderite ore, a model mining town is being built. This branch is laid with 80-lb. A. S. C. E. rail, with Seller's shoulder tie-plates on all curves, and is most substantially built in all respects, excepting that timber and piles were used in bridging.

Grading and Bridging on Extension

On July 15 the sub-contractors on the Hawk Lake-Hobon section finished the grading. These sub-contractors were Murdock Brothers on the lower 19 miles and Cavicchi & Pegano on the upper 11 miles. The work was quite heavy, the grading quantities being 732,933 cu. yd., classified as 261,269 cu. yd. solid rock, 94,378 cu. yd. loose rock and 377,286 cu. yd. common excavation. In addition there was 20,178 cu. yd. overbreak in rock cuttings. About 3,000,000 ft. B.M. of bridge timber and 40,000 lin. ft. of piling were also used on this work; other items included 1,500,000 cu. yd. overhaul, 170,000 ft. B.M. culvert timber, 220,000 lb. bridge iron, 291 cu. yd. dry stone masonry, 423 cu. yd. cement masonry and other small items. The rock work was exceptionally well done, as the specifications only allowed common excavation for overbreak and all the time the work was in progress this was enforced. On the final estimate, however, a fair amount of overbreak was given as solid rock.

Track-laying and some ballasting was done this year and the bridge work was completed. On January 10, 1912, the track was connected up, giving railroad connection from the Canadian Pacific Railway into the mines of the Michipicoten district. Some ballasting was also done this year.

Completion of the Main Line

Work on the main line completion progressed slowly from June, 1910, to May, 1911, at which time track had reached the Montreal River, Mile 91½ north of the Sault. Here a steel viaduct 1,550 ft. long and 130 ft. high, had to be constructed. This viaduct was designed in 1902 by Messrs. Boller & Hodge, of New York, and the contract was arranged at that time with the Canadian Bridge Company for its erection. Due to the suspension of this work, the contract was never carried out, and upon taking up the work to complete same, the contract was awarded to the Canadian Bridge Company. There are 1,745 tons of steel in this viaduct, and since the alignment was on a curve at each end, it was a very interesting job of erection.

The viaduct consists of tower girders supported on steel legs with concrete pedestal piers and end abutments. There are thirteen 30-ft. tower girders and one of 40 ft., situated on an island in the middle of the river. The intermediate girders consist of one 85-ft., five 75-ft., ten 60-ft. and two 30-ft. spans. The structure is designed under the Dominion Government specifications, Class 1 loading, and is a splendid piece of work. Due to some poor work in concreting the piers and having to rebuild some, the erection was slow. However, track was laid over this viaduct and track-laying proceeded north of it in October, 1911. When these notes were prepared the track on this section was at Mile 104½. At the north end track-laying had progressed to Mile 117, leaving a gap of 12½ miles, which, it is expected, will be finished by the middle of the present month.

Heavy Bridging and Difficult Location

The principal reason for the slow progress made in track-laying is the excessive amount of bridging and trestles on this line. Between the Sault and Josephine Junction there is about 16,000,000 ft. B.M. of bridge timber in 140 structures, besides 100,000 lin. ft. of piling. Some of these bridges are very large, and as all the bridge timber used, excepting a few thousand feet out in the country, is British Columbia fir, it is necessary to build them from end of steel.

The old line from Sault Ste. Marie to Hawk Lake Junction is through a most difficult country for construction, and the location secured, while good work on the whole, shows it. The line to the Junction with the new extension and on to Michipicoten is badly handicapped with heavy grades and sharp curvature, there being 1½ per cent uncompensated grades and 12-deg. maximum curves. To improve this grade and alignment would require extensive re-locating, hence, for the present, this is not contemplated. The route is very picturesque, and travellers have a treat in rugged scenery awaiting them on the opening up of the Algoma Central for traffic north of the Sault.

Lighter Work on Northern Section

While the above work was progressing south of the Canadian Pacific Railway, a location was made north to the Transcontinental Railway at the new town of Hearst, or Grant, the first division point west of Cochrane, 101 miles north of the Canadian Pacific Railway. This location is on the same grades and curvature as that on the Hawk Lake-Hobon section, that is, 0.6 per cent compensated grade and 6 deg. maximum curve. Mr. Louis Whitman, locating engineer, had charge of the location with Mr. Sanford Hazelwood and Mr. W. H. Wilkie in charge of the parties. The route traversed by this line is through rough country for thirty miles north of the Canadian Pacific Railway. Beyond this the line enters the great clay belt of Northern Ontario and the grading work is light. The south thirty miles brings up the average cost of this line to about $30,000 per mile, including track and structures.

The crossing of the Canadian Pacific Railway and the Canadian Northern's Ontario extension (under construction) is made at grade. There are very few bridges on this 100 miles and none at all of any size excepting some bay crossings of Oba Lake, where four pile trestles are driven, one of them being 1,302 feet long with deck 10 feet above the water. The balance of the bridging consists of pile structures, the largest being the crossing of the Mattawishquia River, near Hearst, at the Junction with the National Transcontinental, which is 700 feet long.

The grading quantities on this 100 miles will be approximately 360,000 cu. yd. solid rock, 250,000 cu. yd. loose rock, 1,500,000 cu. yd. common excavation and 3,500,000 cu. yd. overhaul. There are about 80,000 lin. ft. of piling and 1,500,000 ft. B.M. of bridge timber, besides other lesser items. Corrugated ingot-iron pipe is used in culverts, no concrete at all and a few native timber culverts.

In August, 1911, a contract was let the Superior Construction Company, of Sudbury, Ont., for the construction of the section complete, including grading, bridging, track-laying and ballasting.

Extensions and Terminal Work

Explorations for further extensions of the Algoma Central & Hudson Bay Railway to the north of the National Transcontinental Railway have been made. A copper metallic-circuit telephone line has been constructed from Sault Ste. Marie through to Michipicoten Harbor, and extensions to the mines and north to Hobon and Hearst will be made this summer.

At Sault Ste. Marie new terminals, consisting of a new modern engine house, machine shops, stores and office building, and a new terminal station and office building are all contracted for and the work started. This work involves the expenditure of about $500,000 and includes an extension of the main line to a point nearer the centre of the city of Sault Ste. Marie, and a new yard at Tagona, the industrial centre, where extensive alterations and additions to the terminal facilities are being made. The company will also build a large coal and ore dock at Michipicoten Harbor in the near future.

The above work has all been in charge of the writer, as chief engineer, since the beginning, with a staff of division and resident engineers. Messrs. G. F. Hersey and C. Le B. Miles have charge of the work at the north end and Messrs. L. C. Maxwell and J. A.

Hedgecock at the south end, as division engineers. Mr. W. C. Franz is general manager and Mr. G. A. Montgomery superintendent, of the Algoma Central & Hudson Railway, and also of the Algoma Eastern Railway.

The Algoma Eastern Railway

The original charter for this railway, 85 miles long, now being completed from Sudbury, Ont., to Little Current on the Manitoulin Island, was obtained by Mr. F. H. Clergue at about the same time as the Algoma Central project was launched. Like it, a land grant and subsidy accompanied the granting of the charter. Actual construction was delayed from year to year, after the first section of 13 miles, extending from Sudbury to Gertrude Mine, was constructed in 1900-1901.

An extension of ten miles from Gertrude Mine to Crean Hill was constructed in 1909, bringing the end of steel 23 miles west of Sudbury, where connection was made with a spur track connecting with the Canadian Pacific Railway at Victoria mine station. This spur, three miles long, is owned by the Canadian Copper Company and connects the Crean Hill Mine with the Canadian Pacific Railway. This 23 miles of line passes through the richest nickel district in the world, the famous Sudbury nickel district, and practically the entire revenue derived from its operation is for handling the ore from the Creighton and Crean Hill mines to the roasting yards of the Canadian Copper Company at Copper Cliff.

Location Work

In 1909-1910 surveys were undertaken to locate a line extending this railway to Little Current on the Manitoulin Island. A party in charge of Mr. Louis Whitman, locating engineer, was started at Little Current on a route over which the writer had run a line for the old Sault Company in 1900. This line traversed the islands and along the shore of the North Channel to the mainland at the mouth of the Whitefish River, thence to a connection with the Canadian Pacific Railway at a point on the Spanish River called Espanola.

A short section of 1½ miles of this original surveyed line was constructed in 1901, connecting the site of the Spanish River Pulp & Paper Company's plant on the Spanish River with the Canadian Pacific Railway's Sault branch. This little section or spur was constructed by the Sault Company and turned over to the Canadian Pacific Railway to operate, under an agreement contemplating the ultimate completion of the whole project. When the writer took charge of the work, a location was pushed through to connect with the Sudbury end at Crean Hill, a distance of 62 miles from Little Current. A maximum 1.25 per cent compensated grade and a maximum 11 deg. curve (with a 12-deg. curve near Whitefish) was secured at a cost of about $32,000 per mile complete, including track, ballast and buildings.

Construction in Rugged Country

In July, 1910, a contract was let to the O'Boyle Bros. Construction Company of Sault Ste. Marie for the construction of the 20-mile section from Little Current to the main shore at Whitefish, and in March, 1911, another contract was let to the Superior Construction Company for the balance of the work from Whitefish to Crean Hill, 42 miles. The grading work on this 62 miles is now practically complete and track-laying has just been started at Espanola. The 62 miles of track will be laid and ballasted about October 30th next.

The country traversed by this railway is almost wholly unsettled, and, south of Espanola, is very rugged. From the Whitefish River to Little Current the scenery is most picturesque, as the line here follows close to the water and winds around the headlands and bays of that section of the North Channel known as the Bay of Islands. The grading on this section, while practically all solid rock, was not excessive in cost, averaging about $20,000 per mile, including bridging.

From Espanola easterly to the junction with the old line at Crean Hill, the line passes over a better country, but which is of little value from an agricultural point of view. An under-crossing of the Canadian Pacific Railway's Sault branch is obtained near the village at Nairn Centre. At this point the Algoma Eastern passes under the Canadian Pacific Railway embankment, the tracks of the latter company being carried over on a 27-ft. 7-in. skewed deck plate-girder span on concrete wing abutments.

Bridges and Roadway Structures

The bridging on the entire line from Sudbury to Little Current is light for such a country. The steel structures consist of one 105-ft. and one 60-ft. deck plate-girder span on stone abutments and centre pier at the Vermillion River crossing, 17 miles west of Sudbury; one 180-ft. through riveted-truss span at the second crossing of the Spanish River at Espanola (built in 1901), and two 100-ft. girder spans at two other points, together with a 36-ft. deck-girder span on concrete abutments at an overhead crossing of the Government trunk road near Espanola. These major structures are supplemented by a number of timber trestles and pile bridges.

At Little Current, in order to cross the channel in front of the town, at which point there is considerable vessel traffic, a bridge some 600 feet long is required, with a draw span. This structure will be erected during the present year.

The traffic expected for this railway consists of ore, pulp and paper, coal and the products of the Manitoulin Island. Previous to the construction of this line, the island was entirely dependent on water communication with the mainland. This island is 90 miles long, averaging 8 to 12 miles wide, and is capable of great development. The population at present is about 20,000. At least one-half of the island is fine agricultural land, particularly adapted to hay and stock raising. The construction of the Algoma Eastern Railway, formerly known as the Manitoulin & North Shore Railway, has been most eagerly looked forward to for years by the residents of Manitoulin Island.

The writer has been in charge of the completion of this line as chief engineer since the work started, with Mr. B. E. Barnhill as division engineer, with headquarters at Sudbury, Ont.—Engineering Record.

The Canadian Hippodromes, Limited, is a new company organized in London which contemplates the erection of a chain of large play houses across Canada. Options on building sites are stated to have already been secured in Halifax, St. John, Montreal, Ottawa, Hamilton and Toronto. Capt. Yates, the representative of the firm, was recently in Vancouver talking of an investment of $500,000 in property and building in that city.

Sewage Disposal at Moose Jaw

The sewerage system of Moose Jaw consists of a separate sanitary sewer system and a storm water system. The sanitary sewer system is a method where only sanitary sewage is taken in with a corresponding use of small pipes and self-cleansing velocity. When the system was first designed, the sewage passed through a small septic tank discharging into the Moose Jaw Creek. With the growth of the city, however, a larger tank with a capacity of 135,000 imperial gallons per 24 hours was designed, discharging into the creek about one-quarter of a mile east of the old tank. This latter tank was connected with the existing system by an 18-inch vitrified tile trunk sewer. The continued growth of the city and the new public health act adopted by the province, have necessitated the installation of an up-to-date sewage disposal works, which consists of screening chamber, stand-by tanks, bacteriological filter. The effluent from the filters being further treated by disinfection where necessary, more especially during times of epidemic, so that the final effluent that is discharged into the creek will be of a non-putrescible nature, and harmless either to fish, stock or persons. Sludge in the sewage will be treated on filter pits and when dry, burned in the incinerator, which has been erected adjacent to the disposal works.

A short summary of the different parts is as follows:—

(1)—Screen house (14 feet 6 inches by 12 feet) into which trunk sewer empties, all large heavy solids being retained by screen.

(2)—Two covered stand-by or equalizing tanks, built entirely of reinforcing concrete, each being approximately 122 feet by 6½ feet deep or 95,000 gals. capacity each.

(3)—Pump house, 30 feet by 20 feet, containing (at present two but provision made for future addition) compressed air ejectors, which raise the sewage from stand-by tanks to separator tanks.

(4)—Separator tanks. These are three in number, each being approximately 24 feet by 60 feet by 7 feet deep, or each of 62,500 gals. capacity. The sludge here settles and is carried away by underlying sludge drains to sludge beds.

(5) Sludge beds, two in number, 50 feet by 35 feet by 3 feet deep. Eventually sludge is burned at incineration plant which is located near by.

(6)—Percolating filters. Effluent from separator tanks passes to filter beds, of which there are twenty-six. Each being approximately 70 feet by 14 feet by 8 feet deep. The effluent is distributed over the filter beds by means of Stoddard trays. The filtering media is broken stone with underlying drains which collect the effluent after passing through the media.

(7)—Disinfecting chamber. The effluent from the filters is carried to a disinfecting chamber, 30 feet by 13 feet, where disinfecting liquid is added as occasion may demand.

(8)—Settling pond. From the disinfecting chamber the effluent passes to a large settling basin, 225 feet by 125 feet by 3 feet deep, from which it eventually passes to the creek.

Each filter unit is estimated to be capable of handling about 43,300 gallons of effluent per day, making a total of about 1,125,000 gals. per day, which will provide for a population of about 37,000 persons. The entire plant being designed on a unit system, will permit additional units to be added as necessity demands. The substructures are all built of reinforced concrete, the superstructures being frame cover with corrugated galvanized iron sheeting.

The total cost of plant as at present designed is about $134,251, $125,000 being for construction of building and extension of present sewer system to plant and $9,251 for special machinery and equipment.

A Temporary Cement-Wash Protection for Bridge Timbers

A temporary fire protection for old timbers on a steel bridge where the length of useful service had nearly been reached and the wood badly checked was recently provided on the Boston & Maine Railroad by a wash made up of Portland cement, plaster of Paris and sand. The bridge was a deck structure, located at such a distance from the station or houses where attention might be attracted by a fire burning on it, that some form of protection was considered advisable during the period of one or two years remaining in the life of the ties. There were wide and deep cracks in some of these ties, and as sufficient experience had not yet been had at that point with the use of fire-resisting paints to give assurance of their effective service, experiments were made in filling the cracks with various compositions, and also covering the entire top surface of the ties and guard rails.

The first experiment was with cement and water alone, but this plaster cracked and came out of the cavities in the ties, so as to afford very little protection. A mixture of lime, cement and sand was then used on another portion of the bridge and was found to give better protection. Finally a mixture of cement, plaster of Paris and very fine sand was tried, this being mixed so thin that it would run in and fill all of the cracks in the ties and guard rails. It was washed over the entire surface of the timber.

This form of protection proved effective in stopping fires on the bridge for a number of months, but was considered only as a temporary expedient. The expense of the application was about the same as that for the application of a coating of fire-resisting paint, but the durability was considerably less than that of a paint. Since this work was done the fire-resisting paints have been investigated further and found to be sufficiently serviceable as a protection. They are believed to be preferable, where the protection is desired to last for any considerable period.

These experiments and observations on the cement-wash coatings were made by Mr. B. F. Pickering, supervisor of bridges and buildings at Salem, Mass.

The commission plan of city government has been adopted by St. Paul, Minn., and by Atlantic City, N. J. St. Paul, with its population of about 215,000 at the last census, is the largest U. S. city which has yet adopted this plan. The six other U. S. cities of more than 100,000 population which have adopted the commission plan, together with their population and date of adoption, are as follows: Lowell, Mass., 106,294; Birmingham, Ala., 132,685; Memphis, Tenn., 131,105; Omaha, Neb., 124,096; Spokane, Wash., 104,402; Oakland, Calif., 150,174. Memphis adopted the plan in 1909; Spokane and Oakland, in 1910, the other three cities in 1911.

The Engineers' Club of Montreal

Origin, History and Development of One of the Most Successful Social Organizations of the Kind in the Country

THE Engineers' Club of Montreal has a wide basis of membership, and includes in its ranks, architects, contractors, supply men, merchants, lawyers, journalists and doctors. Probably its great success as a social club is due to this broad character, although by far the great majority of the members are directly or indirectly connected with engineering, either professionally or otherwise.

Like most institutions of the kind, the beginning was of a very modest character. In the fall of 1902 several engineers got together and decided that Montreal was large enough for a distinctive club. The result was an energetic canvass of prospective members, and the outcome was a resolution to enlarge the original idea by taking in architects, contractors, supply men, and those interested in engineering works. The Club began to take shape, and on December 30, 1902, a meeting was held in the Windsor Hotel at which a committee was appointed to put into practical form the suggestions of the meeting. Many further meetings were held, and in April, 1903, a petition was prepared asking the Quebec Legislature for a charter. This petition was signed by the following gentlemen: Messrs. Percival W. St. George, civil engineer; W. McLea Walbank, engineer; Thomas W. Lesage, engineer; Louis G. Papineau, engineer; Courtland MacLean Strange, engineer; Edmund Sheppard, engineer; Lewis Skaife, merchant; Claude de Bellefeuille Leprohon, engineer; Stuart Howard, engineer; Richard Smith Lea, engineer; Augustus F. B. Austin, merchant; Eugene McGee Quirk, contractor; Samuel A. Finley, architect; William H. C. Mussen, merchant; and John E. Hardman, engineer. The capital stock was fixed at $7,500 in shares of $25 each, and the gentlemen above named were constituted the first directors. The object of the club was stated as the "acquisition and maintenance of a club house in the City of Montreal, for the purpose of recreation, instruction and amusement."

On May 8, 1903, at a meeting held at the Canadian Society of Civil Engineers, the following committee was appointed: Messrs. K. Blackwell, S. Finley, J. E. Hardman, S. Howard, C. de B. Leprohon, Percival St. George, C. M. Strange, W. McLea Walbank and J. Reid Wilson. This committee began the real work, for they rented a building on the corner of Dorchester and St. Genevieve streets, and it was here that the club was located for three years. Its membership steadily increased, and has grown until the Club is now amongst the foremost in the Dominion.

After the granting of the charter, the chartered members decided to increase the membership to 450, consisting of 300 ordinary and 150 privileged members. It should be explained that although there are two classes of members there is no distinction in the advantages and powers of each class. The ordinary members are those gentlemen who are engineers, architects, contractors, manufacturers and those interested in engineering works, while privileged members are professional and business men interested in the objects of the club. Naval and military officers and members of the Governor-General's staff are also eligible for membership.

With the increase in numbers, the club house was found to be too small, and Mr. Percival St. George, on behalf of the committee, purchased from the Misses Dow the present property consisting of 13,500 square feet. The location, in Beaver Hall Square, is an ideal one for a club of this character, as it is within easy reach of the down-town district where most of the offices are situated, and it is also accessible for the up-town residential district. The building stands alone, and is in a sense away from elements which might disturb men who desire to spend a social hour. It has lately been found imperative to extend the

Mr. H. H. Vaughan

Mr. J. B. Tresidder

Mr. G. A. Ross

Mr. Ernest Marceau

Mr. Herbert Brown

Mr. R. M. Wilson

Mr. C. M. Strange

structure in order to meet the growing applications for membership. The committee therefore have decided to make an addition, and are fortunate to possess the necessary land, adjoining. Messrs. Saxe & Archibald, architects, Montreal, have prepared plans for this addition, which, when it is completed will give, with the present building, accommodation for 600 members. The Quebec Legislature has passed the necessary bill, under which, also, the club has secured a revised constitution. The extension will be in keeping with the present structure, and will involve the remodelling of certain parts. The exterior will be of concrete faced with stone. On the ground floor there will be a lounge hall, porter's office, writing room, a large billiard room, service department, &c., while on the second floor the feature will be a large club dining room, 79 ft. x 39 ft. 6 in., and 22 feet high; on the same floor there will be located the secretary's room, private dining rooms, smoking rooms, ladies' dining room, and reception room. The attic will contain dining and card rooms, a few bedrooms, and domestic accommodation. When the addition is completed, the Club will have one of the finest and most comfortable club houses in Montreal. Its growth is a tribute to the excellent management of the various committees.

The Club has only had two presidents, one being Mr. Percival St. George, who was elected to that position eight years in succession, retiring last year to make room for Mr. H. H. Vaughan.

The officers for the year are: President, Mr. H. H. Vaughan; vice-president, Mr. E. McG. Quirk; hon. treasurer, Mr. J. B. Tresidder; secretary, Mr. R. W. H. Smith.

The following comprise the committee: Messrs. H. H. Vaughan, J. B. Tresidder, E. Marceau, C. M. Rudel, E. McG. Quirk, Herbert Brown, H. Holgate, R. M. Wilson and G. A. Ross.

Steel pipe caisson pontoons in place of cumbersome wooden pontoons for suction dredges are being used by the Department of Public Works, New South Wales, in connection with river and harbor improvement. Mr. E. M. de Burgh, chief engineer, states that wooden pontoons are unwieldy to transport and costly to maintain. An experiment, which is said to have proved a great success, has been made with steel pipe caisson pontoons made in parts none of which weighs more than half a ton. These are easily assembled and can be readily cleaned and painted.

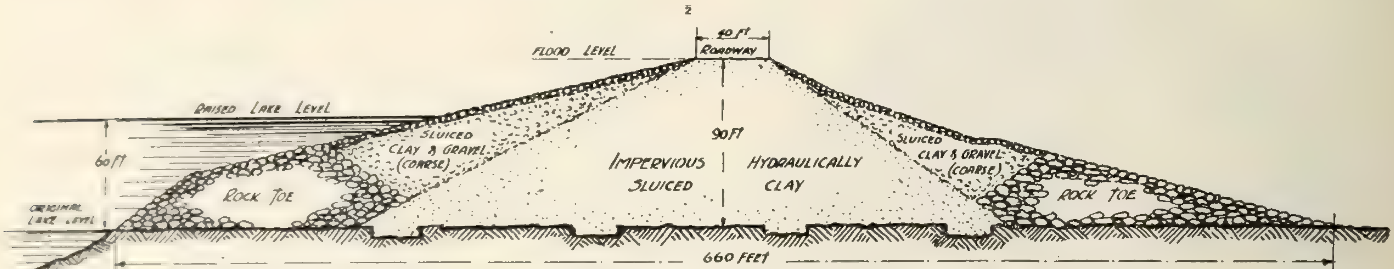
Ligno-concrete slabs have been used in buildings erected in Victoria, B.C., by the Pacific Coast Construction Company of that city. The slabs are 2 x 8 ft. in area and 1½ or 3 in. thick. The thin slabs are used where a wall with an air space is desired. The reinforcement consists of ½ in. fir rods connected by wires. Similar reinforcement is being advocated for beams; the wood is not claimed to be as reliable as steel, but, if properly selected, it is asserted to be effective for certain purposes.

The Great Dam at Lake Coquitlam

Considerations which led to the Construction of a Hydraulic Earth Fill Dam—The Operations in Detail

The principal hydro-electric generating station of the British Columbia Electric Railway Company, Limited, is located on the North Arm of Burrard Inlet, sixteen miles from Vancouver. Here water is delivered at a head of 400 feet from Lake Buntzen, a body of water about 500 acres in extent and having a drainage area of seven square miles. The supply from this lake alone is not sufficient for the company's needs and to overcome this condition additional water is brought from Lake Coquitlam through a hydraulic tunnel 12,750 feet in length which pierces a mountain of solid granite, 4,000 feet in height. Operation s were completed recently whereby the tunnel was enlarged from its original size of 9 by 9 feet to its present cross section of 192 square feet. The provision of the enlarged tunnel was made in view of the company's operations in connection with the increasing of the storage supply at Lake Coquitlam. In this article an effort will be made to describe the great dam on which the company has been working for several years to accomplish that end.

Lake Coquitlam lies directly east of Lake Buntzen, being separated only by the great mountain through which the hydraulic tunnel is driven. It is about seven miles in length and has an average width of 2,500 feet, its approximate area being 2,330 acres and its watershed about 105 square miles. The lake is well located for the purpose of a source of water supply for a hydro-electric plant as the precipitation over the watershed averages 156 inches annually. The streams flowing into the lake have their original source in the high mountains surrounding the body of water where the winter snows are very heavy, remaining in the clefts of the higher peaks until late in the summer. The average runoff is nearly 1,000 cubic feet per second, the coefficient of runoff being from 75 to 80 per cent.



SECTION OF COQUITLAM DAM

The natural level of Lake Coquitlam is at an elevation of 432 feet. When the B. C. E. R. Co. developed the North Arm generating plant in 1904 a rock filled timber crib dam was thrown across the outlet which raised this elevation to 443 ft. As the need of the company for an increased supply of power with which to generate current for the territory of 1,600 square miles on the British Columbia mainland which it covers with its service developed through the amazingly rapid increase of settlement and wonderful advance of population and every form of industrial activity, its engineers set to work to devise plans for increasing the storage capacity of the lake and conserving a supply which was then flowing down the Coquitlam River to join the Fraser River. After careful consideration it was decided to build a great dam just below the existing timber crib dam which would raise the level of the lake by sixty feet. This would result in increasing the storage of the lake by 162,000 acre feet and give an available supply, when the reservoir is full of about 175,600 acre feet or 7,562,000,000 cubic feet.

After a complete study of local conditions by various engineers it was decided that it was impracticable to build a masonry dam at the desired point owing to the difficulty of finding the bedrock foundation necessary to support a dam of this type and of as great a height as was proposed. On considering the question from every point of view it was decided to construct a hydraulic earth fill dam on the recommendation of Mr. J. D. Schuyler, M. Am. Soc. C. E., who acted as consulting engineer on the project until all the original plans for the dam had been prepared.

The location of the dam is at a point where a great natural dam had been formed across the valley by a receding glacier. This left on the ground any desired quantity of the very materials required for the earth fill type of dam, the original natural dam being composed of fine blue glacial clay and tightly cemented gravel and boulders.

The elevation of the crest of the dam is 518 feet, and at this point it has a width of 40 feet and a length of 850 feet. On the upstream side the slope is five to one from the crest to elevation 467 and from this point to the toe the slope is 1½ to 1. On the down stream side the slope is 2 to 1 from the crest to elevation 500, 3 to 1 from this point to elevation 475 and from a berme, 6 ft. in width, at this point to the toe the slope is 4 to 1. At the toes of the dam on either side there are heavy rock walls which will hold the material sluiced into the dam. Both slopes are covered with riprap of a thickness of 3 feet, this being laid in concrete on the upstream side as far as the normal water level line. No care wall of any kind is provided, water-tightness being secured by the great thickness of puddle keyed into several shallow trenches, the dam being almost entirely built on tight blue glacial clay which is quite impervious and forms a splendid foundation. The east end of the puddle keys into a deep trench sunk to the surface of the granite ledge which slopes at a steep angle towards the centre of the glacial valley.

The extreme height of the crest above the lower toe of the dam is 98 feet. The total volume of the dam is 530,000 cubic yards, of which 32,600 cubic yards represent the rock used in the toewalls and the riprap, the balance being sluiced material.

A perusal of the above particulars concerning the Coquitlam dam will show that the work was planned along generous lines, the dam standing at the head of its type as regards sectional area.

The spillway is located at a point separate from the dam, being at the east end and formed by cutting through the solid rock, forming a spur of the ledge. The spillway is 150 feet in length and 250 feet wide at its entrance, taper-

Land clearing operations on portion to be flooded

ing to 185 feet on the down stream side. It is placed at elevation 503, fifteen feet below the dam crest and its construction involved the excavation of 75,000 cubic yards of material, of which 53,000 cubic yards was rock. The capacity provided by the spillway is 12,000 cubic feet per second when the water is 7 feet deep over the sill. On the west side of the spillway is being cut a channel 20 feet wide and 7 feet deep for the removal of drift on the surface of the lake, this being provided with a movable dam so that no water may be wasted.

During the construction period the water from the lake is being diverted through a tunnel carried through the ledge, under the spillway, which will later be used as an outlet or sluice tunnel. This tunnel is 490 feet in length and has a sectional area of 400 square feet. Its width is 26 feet and the height to the centre of the roof, which is semi-circular, is 18 ft. 6 in. A fall of ten feet prevails through the tunnel, which was planned to carry 12,000 cubic feet per second when the lake is at elevation 475. To carry the water to the tunnel a channel has been excavated 860 feet in length and 40 feet wide at the bottom, with sides on a slope of 1½ to 1, this work demanding the removal of 202,000 cubic yards of material. On the lower side of the dam the diverted stream was allowed to cut its own way back to its former course only 80,000 cubic yards being excavated to keep it in check.

When the dam is completed the flow of water through the sluice tunnel will be regulated by gates controlled from a concrete tower and gate house built over the tunnel and connected with the lake shore by a concrete bridge. These gates are each five feet in diameter. Inclined racks to prevent material drifting into the tunnel and auxiliary gates for use when the sluice gates are being examined are also arranged.

The water supply of the city of New Westminster is taken from Lake Coquitlam and the construction of the new dam made necessary the provision of a new intake. This work was assumed by the company which has erected a heavy circular concrete intake tower on a spur of the bedrock extending into the lake, the structure being connected with the shore by a concrete bridge. The tower is of 18 feet inside diameter with walls 4 ft. 6 in. thick at the bottom, which is located at elevation 428, tapering to 18 inches at the floor of the gate house, which is level with the crest of the dam. Four square intake openings, each 40 inches square are provided at elevations ranging from 430 to 487, the openings being belled and provided with racks as well as gates of special design on the inside of the tower. Arrangement is also made for the water passing through screens, these being provided in duplicate. Within the

Preliminary work on toe-wall of dam Lake Coquitlam

General view of operations of B C E. R. Company at Coquitlam dam [illegible] intake is placed consisting of a standpipe [illegible] inches in diameter. This is in four sections, each having conical seats on the ends and resting on the one below it, the bottom section resting on a heavy cast iron elbow on the tower floor. The intake pipe sections are firmly guided by heavy rails bracketed into the tower wall and are operated by hand. At the base of the tower a channel, 20 feet wide and with sides sloping at 1½ to 1 is cut to the deep water of the lake. From the intake tower the water supply is conveyed to the mains leading to New Westminster through a tunnel 1,938 feet in length extending around the east end of the dam and connecting with a distributing chamber near the lower toe of the structure. This tunnel is chiefly driven through rock where it is 6 ft. 6 in. high and four feet wide and has a concrete-lined floor. For 508 feet of its length, however, rock work was impracticable and for this distance a steel pipe, 4 feet in diameter and encased in concrete is provided.

The company's operations at Lake Coquitlam will cause the flooding of 1,000 acres of wild land nearly all of which is covered by timber averaging about 30,000 feet board measure to the acre. On account of New Westminster taking its water supply from the lake the Dominion authorities advised that this land be cleared and this extensive work is now in progress. The clearing is being done by hand or with the aid of a donkey engine, according to location, the marketable timber being left to be floated down the lake during the period of high water. The company is now constructing a logging railway from the dam to Port Moody at the head of Burrard Inlet, which will be utilized for the delivery of these logs to the mill as well as for general log deliveries from the extensive private limits which it taps.

The preliminary work on the Coquitlam dam was started in the winter of 1908 when clearing work was done on the 60 acres covered by the actual dam operations and exploration work carried on for ascertaining the character of the foundations. During the following winter the pumping plant was installed and in 1910 work was started on the stripping of the dam foundation and the excavation for the diversion channel.

Hydraulic operations on the discharge canal

Excavation work on the project has been chiefly carried out by the hydraulic process and, taking the work as a whole, this method has been more successful than had steam shovels been used. All the flumes used in the excavation work are made of timber, are rectangular in shape and 20 inches in width, the bottom being lined with ¼ in. steel plates. On one section of the excavation where the cut was made through boulder clay banks, the flume having a grade of over 3 per cent., 11,000 cubic yards were taken out in a working week of 120 hours. In this case one jet delivering 10 cubic feet per second at a nozzle pressure of 110 pounds was employed. In the excavation of the cemented gravel and boulder formation drilling and shooting was followed wherever practicable. On the cemented gravel it was frequently found that the best results were obtained by the hydraulic method, a high pressure jet being used at close range. In excavating the lower levels recourse was had to hydraulic elevators to lift the material to the flume level and the boulders were removed with a dragline bucket or derricks and dumped into the rock wall forming the toe of the dam.

Steel pipe for New Westminster water supply

In the construction of the New Westminster water intake tower a cofferdam was built at the point chosen, the sheet piling being driven into the silt forming the lake bottom. The excavation at this location was 10,000 cu. yds., 8,500 of which was sluiced by the hydraulic method and lifted by a hydraulic elevator.

In carrying on the work on Lake Coquitlam, the company operates a small tug boat the "Nortona," which is used for the carriage of materials to the various camps, and also in taking the men to their work on the clearing operations at the head of the lake.

Particular attention has been given by the company to the sanitary condition of the camps, and sanitary experts who have visited the place declare that the company's provisions in this regard are well nigh ideal.

The sluicing of material into the dam will be started during the present summer. As the borrow pits are advantageously located, the choice of material is wide and the grades good, this work should proceed very rapidly.

The construction of the dam is being carried on under the direction of the Vancouver Power Company, a subsidiary organization of the British Columbia Electric Railway Company, Limited. The work is being done under the direction of R. H. Sperling, General Manager; G. R. G. Conway, M. Inst. C. E., M. Am. Soc. C.E., chief engineer, assisted by W. V. Hunt, hydro-electric engineer; Fleming Ramasaur, resident engineer at the dam, and R. Lea, assistant engineer. In carrying out the project J. R. Freeman, M. Am. Soc. C.E., is acting as advisory engineer for the Dominion authorities, and R. S. Stronach is supervising the work on the ground under instruction from the water powers branch of the Department of the Interior.

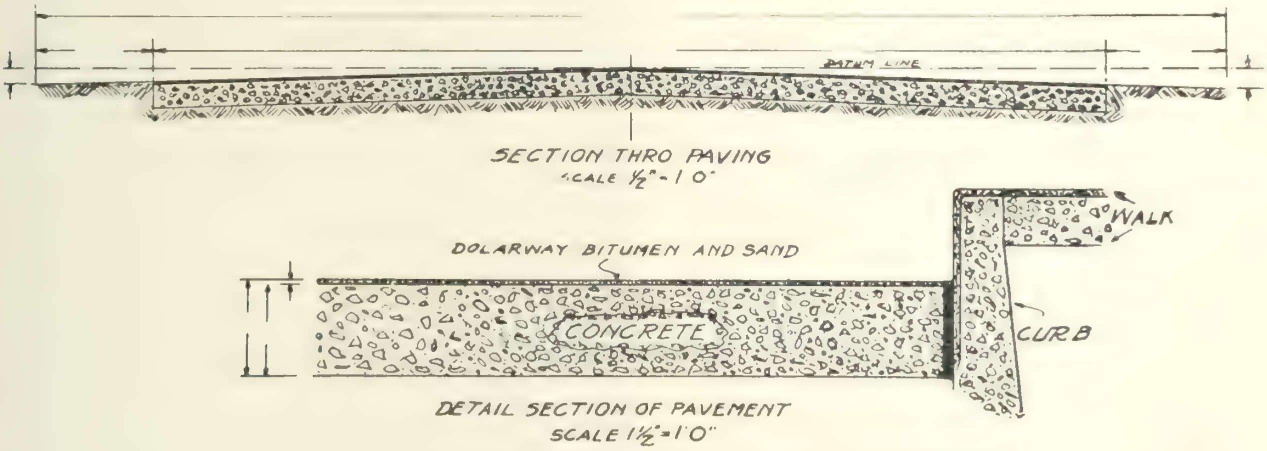
Economics of Concrete Pavements

Methods of Construction and Costs of Concrete Pavements at Ann Arbor, Mich.

By Corwin D. Smith *

DURING the past few years a distinctly new type of pavement has successfully met the requirements for hard surface improvements and the cost of its construction has been reduced to a low figure. The pavement is simple, as may be seen in the accompanying drawing. It consists of a properly constructed concrete base and a thin wearing surface of bitumen and sand which has been extensively developed and used in all cases in the streets of Ann Arbor, Michigan, and to a slightly less extensive amount in other cities and towns.

About four years ago, in order to prolong the life of the asphalt block pavements, which at that time showed considerable wear, E. W. Groves, city engineer at Ann Arbor, as an experiment, tried covering the surface of the pavement with a thin coating of coal tar and sand. After being subjected to various conditions of traffic for two years this thin wearing surface proved to be so satisfactory that Mr. Groves determined to try it for new construction work on a concrete base. During the summer of 1909 one block on a residence street was paved with concrete having a coal tar and sand wearing surface. In 1910 approximately 18,000 square yards of this pavement were laid, the same type of construction having been adopted for an additional 63,000 square yards on nine main streets and alleys. This year there will be laid in the neighborhood of 165,000 square yards, petitions having been received for a greater yardage than it will be possible for the city to construct.



Detail section of Dolarway pavement and section through the paving

Ann Arbor has a well drained, somewhat sandy sub-soil, and the concrete pavement is laid directly upon the sub-grade without using a sub-base, which would be necessary where a heavy, wet, poorly drained sub-soil is encountered. The concrete pavement proper consists of a 6-in. gravel concrete base, machine mix, in medium consistency and deposited on the sub-soil in the usual manner. Where crushed rock was available, this was preferred. When conditions necessitated the carrying on of traffic where the improvement was being constructed, the concrete was laid in strips one-half the width of the street and every 25 feet an expansion joint ¾-inch wide was inserted diagonal to the axis. An expansion joint was also placed at the curb line.

The surface of the concrete was given a wood-float finish and slightly roughtened by brushing with an ordinary hand street broom. After finishing a section, as described, the form at the center or crown of the street was removed, and the pavement for the other half of the street laid, the new concrete being deposited against that which had been previously placed, so that while there was a joint at the crown of the street it was hardly perceptible. This joint would be decidedly objectionable were it not protected by the wearing surface of bitumen and sand that was later applied. This type of construction can be easily eliminated by laying the pavement in sections extending across the full width of the street. This method is common practice and has been successfully done where concrete pavements have been laid on other streets outside the city of Ann Arbor. Where the street had car tracks, one side of the street was taken as the unit.

After the concrete had hardened the surface was covered with hot bitumen applied from a sprinkler wagon designed for the purpose, having a small firebox beneath the tank to keep the material at the desired temperature.

The bitumen is immediately distributed evenly over the surface of the concrete by brushing with an ordinary street sweeper broom and the [illegible]

Paving work on Central Park, New York City, showing method of Dolorway construction

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* Newhall Smith & Company, [illegible] Seattle.

sand. Approximately one-third gallon of bitumen is applied per square yard of surface, and a cubic yard of sand will cover about 230 square yards, making the wearing surface from ¼ to ⅜ in. in thickness.

For the first pavement laid the ordinary coal tar obtained from the local gas works was used. Later distilled tar was tried and considered to be more satisfactory than the crude tar. Last year preparations of tar and bitumen, under various trade names, were used.

The work at Ann Arbor is done by the city, which has its own equipment, purchases material and hires the labor. In 1910 with common labor at $1.75 to $2.00 per day, cement from $1.07 to $1.32 per barrel, and gravel at 75 cents per cubic yard on the street, the cost of a 6-inch concrete pavement and wearing surface of bitumen and sand varied from 71 to 88 cents per square yard; the total cost, including light grading and an 8 by 8 by 14 inch curb on each side of the street, varied from 94 cents to $1.16 per square yard of pavement on streets of from 30 to 34 feet wide. With the Dolarway bitumen at 8 cents per gallon and sand at 75 cents per cubic yard, the cost of materials and labor for the wearing surface has been approximately 5 cents per square yard. These figures are for the actual cost of construction with materials and labor as given.

The ordinary concrete pavement without a wearing surface of bitumen and sand has been extensively used on city streets and public highways throughout the country, and where properly constructed with suitable materials has given splendid satisfaction. Such a pavement is, however, not as noiseless or resilient as asphalt, macadam or wood block. In addition to the noise there is occasionally some objection to the appearance of and the glare from such a pavement. Some difficulty has also been experienced in preventing wear and chipping at the expansion joints, and the formation of cracks in the surface. By covering the concrete with a thin, though durable, wearing surface these objections are eliminated. This can be done at a cost not exceeding 30 cents per square yard of surface. The appearance of the pavement is changed; it becomes noiseless and much more resilient, the carpet surface takes the wear, protects the expansion joints and hides unsightly, though otherwise unobjectionable, cracks should they occur.

The materials required for the construction of this pavement are to be found, or are easily obtained in all localities, and the equipment necessary, besides the usual tools owned by every contractor, consists simply of a concrete mixer, a tank wagon for sprinkling bitumen, an ordinary street sweeper and a wagon provided with a sand spreader.

First-class construction for this type of pavement should consist of 6-inch concrete base mixed one part cement to 2½ parts clean, coarse sand and five parts of crushed stone, or screened gravel laid upon a properly compacted subgrade where a porous, well-drained sub-soil is encountered, or upon a properly prepared sub-base upon a heavy, wet, poorly drained clay soil. In some cases it will also be necessary to lay tile drains provided with suitable outlets.

The concrete should be laid in strips the full width of the street and not to exceed 50 feet long; it should be given a wood float finish and slightly roughened by brushing with an ordinary street broom. A ¾-in. expansion joint should be left every 25 feet across the street diagonal to the axis and at the curb, the expansion joint to be filled with bitumen and sand. After the concrete has hardened it should be sprinkled with one-third gallon per square yard of hot Dolarway bitumen, which should be immediately covered with clean, coarse sand or suitable stone screenings. The pavement or roadway is then ready for traffic.

This wearing surface is apparently the solution for the increasing auto traffic question. Heavy motor trucks do not damage the bitumen to an appreciable extent, and pleasure cars find the wearing surface non-skidding and without exception dustless.

The concrete pavements at Ann Arbor have been subjected for the past three years to all conditions of traffic of a city of 20,000. Kansas City has a small stretch of a similar pavement on Sixth street, which has been exposed since last fall to the heaviest traffic in the city, and is to-day in first-class condition. Based upon the results obtained in these two cities, this type of construction is to be considered as suitable for paving residence streets, alleys, courts and squares, country roads and highways.

It would seem that this combination of these good points of concrete pavement and bituminous pavement meet the demand for the low cost and durability of pavement, and slightly varying with the costs of materials in various localities. It is approximately in first cost the same as the ordinary macadam road, but one of the best types of permanent road improvement.

"Loft" Buildings at Montreal

A feature of this year's building programme in Montreal is the number of "loft" buildings which are being erected or are designed. Those capitalists who are spending large sums in this direction evidently believe that there is a call for light manufacturing buildings, and the financial results from the two or three now in existence certainly give weight to their faith in this class of structure. Messrs.

Shaughnessy Building, St. Paul and McGill Sts., Montreal

Building for A. Sommer & Co., Berthelet and Mayor Streets, Montreal

Hutchison, Wood & Miller, architects, of Montreal, have prepared plans for two loft buildings, both ten storeys in height. One, to be known as the Shaughnessy Building, is to be constructed for Sir Thomas Shaughnessy. The site, on the corner of St. Paul and McGill streets, is 85 x 152 ft., and the building will be of brick and stone, with a steel frame. From the basement up to the first floor the exterior is to be of granite and sandstone. The staircases will be of iron, and fire escapes will be provided in the rear of the building. Marble will enter largely into the construction of the entrance hall, while in the other storeys, the floors will be of hardwood, oak being employed where other wood is required. There are to be two passenger and two freight elevators, these being protected by six inch terra cotta walls. The lighting is by electricity, and the building will be steam heated. A sprinkler system is to be installed. The Peter Lyall & Sons Construction Company, Limited, are the general contractors.

The other loft building is for the A. Sommer Company, and will be put on Berthelet and Mayor streets—thoroughfares not hitherto used for commercial purposes to any extent. The building is to be of concrete, with Indiana limestone up to the first floor. The frontage on Berthelet street will be 150 feet and on Mayor street 70 ft. 6 in. Each floor will have an area of 20,000 square feet, and this is said to be the largest area of any individual floor in Montreal. The entrance hall will be finished in marble, and will run through from Berthelet street to Mayor street. The floors will be of hardwood; stairs of iron; and sprinklers are to be put in. Four elevators will be provided, two passenger and two freight. There is to be electric lighting, and the heating will be on the modulating system. The general contractor is Mr. C. E. Deakin, Montreal.

The Secretary of the British Road Board Entertained in New York City

Mr. W. Rees Jeffreys, secretary of the British Road Board, whose visit to this country in connection with the Third International Congress was mentioned in our issue of June 12, was entertained at dinner on the evening of Wednesday, June 5, at the Hotel Astor, New York City, by the American Road Builders' Association. The dinner was attended by about seventy-five men prominent in road building and paving circles. The arrangements were in charge of a committee of which Professor A. H. Blanchard, of Columbia University, was chairman. Among those who spoke at the close of the dinner were Mr. Nelson P. Lewis, Chief Engineer of the Board of Estimating and Apportionment of New York City and President of the American Road Builders' Association; Professor W. H. Burr, of Columbia University, and Mr. L. W. Page, Director of the U.S. Office of Public Roads.

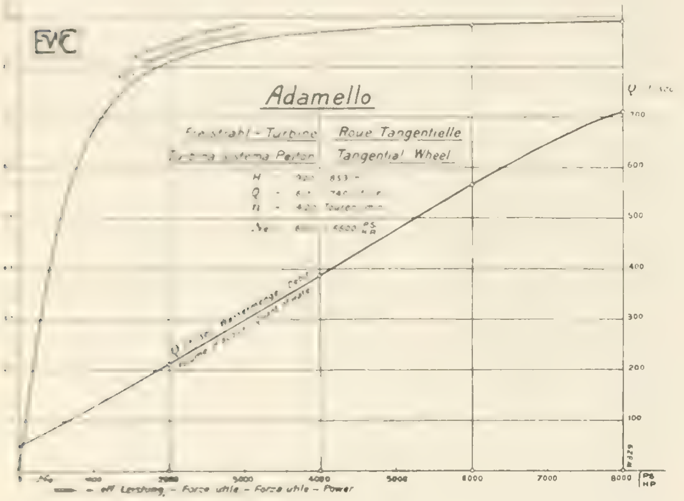
Mr. Jeffreys expressed himself as being much gratified at the cordial reception given him. He spoke briefly of his mission to this continent and gave an outline of the programme of the Congress. Since the last Congress, he said, new conditions have confronted road builders, and the experience gained in building roads to meet these conditions and that derived from the previous congresses will make the third congress especially valuable. He felt, he said, that the questions at the previous congresses had been somewhat too general in their nature. This, he said, would be corrected in the coming congress as the questions to be discussed would be more precise. He also explained the distinction between questions and communications, the difference being that the questions are to be discussed at the congress and the communications are to be discussed only if time permits. Papers in three languages will be presented on both questions and communications, one paper on each of the nine questions and ten communications to be asked from each country represented. In speaking of the road problems in England and in America, Mr. Jeffreys called attention to the differences between those in the two countries. All English engineers, he said, have roads to be maintained, while the American engineers have roads to maintain and also have roads to build. The English roads, according to Mr. Jeffreys, though not perhaps comparing in alignment and grade with the roads of France, are the strongest roads in Europe. There has been a great development of motor traffic, especially that made up of commercial vehicles, and it has been necessary for English road builders to build roads to carry this traffic. In closing, Mr. Jeffreys extended an urgent invitation to engineers to attend the congress, and again expressed his appreciation of the courtesies shown him since his arrival in this country.

As already announced in this journal, Mr. Jeffreys will arrive in Toronto on June 27th and will afterwards visit Ottawa, Montreal and Quebec. During his stay in Toronto, Mr. Jeffreys will be entertained by the Canadian Society of Civil Engineers, the Ontario Good Roads Association and the Ontario Motor League.

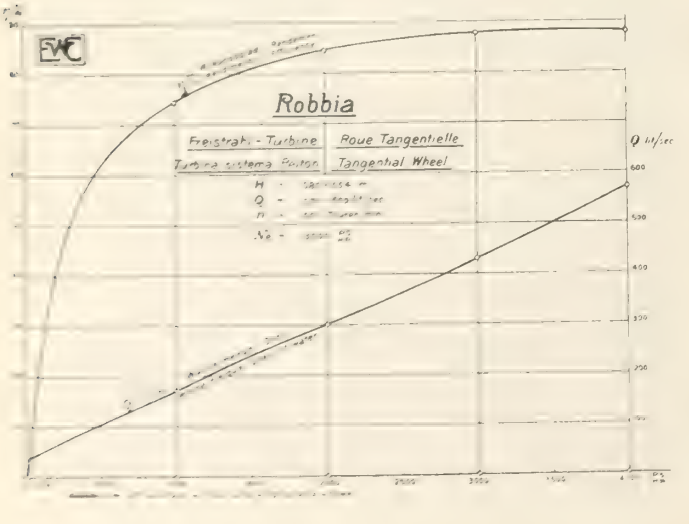
Tests of Impulse Wheels

The accompanying curves show the efficiency obtained at official tests carried out with the latest impulse wheel installations of Escher Wyss & Company, of Zurich, Switzerland, whose head office for Canada is at the Canadian Express Building, Montreal. These efficiencies reached a maximum which has never been approached before.

The curve obtained at Adamello, situated on the border between Switzerland and Italy, relates to an impulse turbine installation working under an effective head of 3,000 feet, each unit being designed for a maximum power of 6,600 B.h.p. when running at a speed of 420 r.p.m. These turbines are all of the Escher Wyss Company's special design and patent, fitted with deflecting nozzle which eliminates the employment of any relief valve, at the same time keeping the rise of pressure in the penstock remarkably low. As a matter of fact, when tests were made and the full load was thrown off, the pressure at the end of the penstock only rose to a very few per cent. above normal. The above efficiency curve which exceeds the guaranteed figures by about eight per cent. is remarkable by the fact that it remains above eighty per cent. from over-load to one-quarter load.



At Robbia, on the border of Switzerland and Italy, the curve relates to the same type of turbine as above described, the effective head being 1,900 feet and each unit having a capacity of 3,500 B.h.p. when running at a speed of 500 r.p.m. This curve is also remarkable on account of the efficiency remaining above eighty per cent. from full load to almost one-quarter load.



Canadian Railroad Development

At Ottawa last week tenders were opened for the erection of N. T. R. stations between Cochrane and Superior Junction. The bids approximated $250,000.

Messrs. Culliton Bros., Spokane, Wash., have been awarded the contract for the grading and bridge work for the first ten miles of the new extension of the Esquimalt & Nanaimo Railway, from McBride Junction to Courtenay.

It is reported from Montreal on the authority of Sir Thomas Shaughnessy that surveys are being carried out for the double tracking of the main line of the C. P. R. between Calgary and Vancouver. The cost of the undertaking is estimated at $70,000,000.

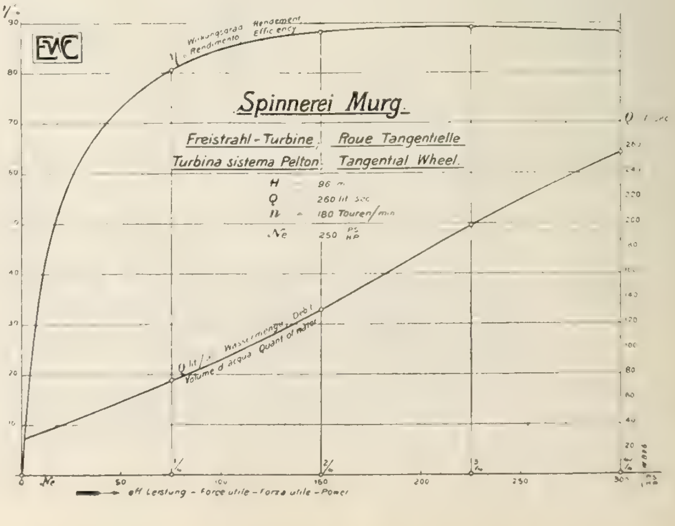
Despite the fact that the C.P.R. has 1,400 men working on the million dollar irrigation ditch at Calgary in the eastern block and the great flume that will carry the water across one of the coulees to be spanned by the system, the contractors declare that they are still six hundred men short of their actual requirements, and when other work commences within the next few weeks they will be a thousand men short.

Messrs. A. E. Trites & Son, Moncton, N. B., the general contractors, have awarded sub-contracts to the following for work in connection with the construction of the extension of the Fredericton & Grand Lake Coal & Railway Company's line from Globe, N.B., to Minto, N.B.; McPhail & Baird, Mavor Bros., Sutton & McLain, Cooke, Kitchen & Co., John Mavor, D. C. Burpee & Son. All sub-contracts on this work have now been let.

The Canadian Pacific Railway has awarded the contract for constructing its $1,400,000 depot at Vancouver, B.C., to the Westinghouse, Church Kerr Company, New York City. In accordance with the agreement with the city, the railway will also build a tunnel in the downtown section to relieve the congestion of traffic. Railway crossings will be abolished and overhead bridges built, the whole involving a total of several million dollars.

Contractors' trains are now running on the National Transcontinental Railway 150 miles west of Cochrane to Hearst three times a week, and 150 miles east of the former points to Peter Brown Creek twice a week. The construction and operation of this line between Graham and Manitoba and east and west of Cochrane has drawn a population that is increasing in number every day. It is estimated that between Graham and the Manitoba boundary alone there are now about 5,000 people.

A programme of railway building involving the completion during 1912 of five hundred miles of new tracks on the C.N.R.'s main line and branches in Alberta and the laying of 1,300 miles on the Peace River branches; the completion of Goose Lake extension to Calgary by September



or October; of the Brazeau line, of the Calgary-Macleod line before the close of the year, and of a very considerable portion of the Oliver branch, and the Calgary-Vegreville branch, was outlined by Sir William Mackenzie, president of the road, during his long visit to Edmonton last week.

The Premier of British Columbia, Sir Richard McBride, in a recent interview on his arrival at Vancouver, stated that he had met Mr. J. W. Stewart, managing director of Messrs. Foley, Welch & Stewart, two days before leaving London and had been informed by him that he had then successfully completed financial arrangements for the construction of the Pacific Great Eastern Railway to connect Vancouver with the Grand Trunk Pacific at Fort George and that work would be started at or near North Vancouver before July 1, while before next fall the company would be employing one of the largest forces of men ever assembled on a railroad contract in the province.

The city council of Saskatoon, Sask., has closed a contract with the Stone & Webster Engineering Corporation, Boston, Mass., for financing the proposed municipal street railway for a year. This has been done without submitting a by-law to the people, in order that there may be no delay and so that the paving operations on the main business streets where the car lines will be constructed will not be held up. Stone & Webster will receive 12½ per cent. on the estimated cost and in addition 5 per cent. on the money loaned. Three carloads of material ordered by the company which secured the charter in the first place, is now in the city and orders have been placed for $60,000 more.

On June 6, Mr. R. L. Borden and the members of the Cabinet at Ottawa, heard a civic deputation from Montreal on the subject of the proposed C.N.R. elevated railway. The deputation objected to elevated tracks on the ground of their unsightly appearance, and that the company could obtain the access to the harbor front by other means. The deputation also objected to paying for the construction of a tunnel under the C.P.R. tracks at a cost of $200,000, which has been ordered by the Railway Commissioners to be done by the city. Mr. Cochrane, on behalf of the Government, stated that he had not yet approved of the C.N.R. plans. As to the other complaint the regular procedure as to an appeal would have to be observed.

On July 2nd a party of twenty-five Government engineers will start from Montreal to inspect the proposed terminals at Nelson, on the Hudson Bay, for the railway that is to be constructed either at Nelson or Fort Churchill. The party, at the head of which will be Mr. Hazen, will sail in the S.S. Boethic. The promoters of the James Bay Railway are also sending by the same steamers, which will make, if possible, monthly trips to the Bay from the St. Lawrence, a number of engineers, who are to make a permanent survey to the several ports around the Nottaway region, with a view to ascertaining the best site for the terminals of the Montreal and James Bay system, which is announced to be started at both ends, viz., at the Transcontinental crossing and at the northern terminus, early next spring. It is expected that sufficient work will have been accomplished by the end of the present season to enable work to go ahead rapidly next season, especially north of the Grand Trunk Pacific, and it is contended that the section beyond the G.T.P. can be completed in two years' time from the turning of the first sod.

The Canadian Gas Association have secured the use of a building on the National Exhibition grounds at Toronto for the purpose of an exhibition of gas appliances. This exhibition will run concurrently with the Canadian National Exhibition from August 24 to September 9. The building will be divided into booths, in which will be exhibited almost every kind of gas appliance manufactured. During the last few years great strides have been made in this field and the public will doubtless avail itself of this excellent opportunity to obtain an insight into the uses to which gas is put.

Cement Duty Halved by Government

The Dominion Government has suspended the collection of half the customs duty upon cement for the period from June 12th to October 31st, inclusive. Under the normal tariff the duty is 52 cents a barrel and under the revised, 26 cents a barrel. The Minister of Finance, in making the announcement, gives as a reason for the reduction that "a serious shortage of cement exists in various sections of the Dominion, due both to an unprecedented demand for the commodity and to the difficulty experienced by eastern producers in promptly making shipments by rail and water." It is explained that the government has been compelled to this course by urgent representations from municipal authorities, Boards of Trade and contracting firms in Western Canada.

British Interest in the Canadian Field

It is often complained that British firms who do business with Canada and other possessions are not alive to the conditions of the trade for which they are catering. The goods manufactured are excellent, but they are often not entirely suited to outside markets, and it is very difficult to make the principals understand that what may be suitable for the domestic field is not so for, say, Canada. The only way in which a proper understanding of the needs of a country may be obtained is to visit that country: to see those interested in the goods produced; and to learn about climatic and other conditions. In the case of Messrs. Adams-Hydraulics, Limited, of York and London, Eng., this is being done. Mr. C. H. Adams, one of the directors, and his brother, are now in Canada and intend to visit the principal cities from Montreal right through to the Pacific. The object is to meet city and consulting engineers, particularly those dealing with irrigation and power projects. This firm is a leading one in the old country, manufacturing apparatus for use in sewage disposal plants, penstocks, valves and water gates. They also make manholes and other iron work for municipalities, a large part of their business on the other side being with civic authorities. Adams-Hydraulics, Limited, already do considerable trade with Canada, through their sole agents, Francis Hankin & Co., 201 Coristine Building, Montreal. Mr. Adams, who will return to England in September, may be communicated with at the offices of the Canadian agents.

Manufacturers' Extended Tour

The party of British manufacturers who are journeying on a tour of the Dominion under the auspices of a British financial journal, left Montreal recently on an extended trip over the Grand Trunk lines between Montreal and Ottawa, between Ottawa and Toronto and between Toronto and North Bay. There are 65 members in the party and the train consists of four 12 section drawing room sleeping cars, together with baggage and dining cars. Proceeding west a visit will be paid to Winnipeg on Wednesday, June 26th, and to Saskatoon on the following day. This route has been carefully chosen so as to show the British visitors the greatest possible amount of the country's agricultural and industrial life in a somewhat short space of time and from the included points as well as the country through which the special train will pass, they should be able to take back with them to the old country a comprehensive impression of Canada as a whole.

From the Law Courts

Responsibility for Road Obstruction.—Judgment for [illegible] Dr. Bateman, to the extent of $12,500, with full costs of the suit was given against the County of Middlesex in an action brought to recover damages for an accident sustained when the plaintiff was answering a hurry call and crashed into an obstruction which had been left on the road during repair work.

Work Done Without Report of Engineer.—In Johnston vs. the Township of Tilbury East, the Court of Appeal held that where repairs to a drainage system are required, if the cost exceeds $800, a report from an engineer is a condition precedent under the Municipal Drainage Act, and only after the council has received and formally adopted the report, by by-law, may it undertake the work "specified in the report."

Contractor's Responsibility for Foreman's Negligence.—In the action, Walberg vs. Stewart & Company, brought to recover damages for the death of John Walberg, a carpenter who was killed during the construction of certain bridge work at Fort William, judgment was given for the sum of $3,000 with costs, the Court holding that negligence was proven in the use of a derrick without the key or pin which is used to keep the collar upon the gudgeon, and that the foreman was responsible in not seeing that the derrick was in safe, working order.

Damages for Taking Down Wall of Building.—Holman vs. Knox was an action where the plaintiff landlord endeavored to recover possession of property leased to defendants who owned the adjoining store and who, in order to facilitate their business, cut a large opening in the wall between the two stores. At the trial the defendants were ordered to restore the wall and to pay the sum of $10 damages. The Divisional Court held that the covenant to repair is a continuing covenant, and each day that there is a state of non-repair, constituting a breach of the covenant, there is a right of entry and a right to forfeit the lease.

Injury to Workman: Negligence Established.—Magnussen vs. L'Adde. In the trial it was set forth that plaintiff, a laborer, 27 years of age, working for defendants, contractors, engaged in construction of a trench or ditch in Port Arthur, was injured while in the bottom of the trench shovelling earth off the rock, when he was struck on the head by a pole falling into the trench, which produced concussion of the brain and left him in a state of general shock. The injuries were alleged to have been caused by negligence of defendants. Plaintiff claimed $5,000 damages. Defendants were found guilty of negligence in not taking proper precautions to shore up the sides of the trench. Judgment was given for $1,100 with costs.

Liability of Municipality.—O'Neil vs. the City of London, Ont., was an action for $10,000 damages for injuries sustained in an accident caused by the plaintiff's being thrown out of his sleigh when approaching weigh scales which had been erected by permission of the city on the side of a travelled road by one Clatworthy. The Honorable Justice Middleton held that the main road was in a sufficient state of repair, but the municipality, by allowing the scales to be erected, had invited the public to leave the main road and use the scales and should have made a sufficient approach on either side of the scales. That the decayed sidewalk was a nuisance especially as it was hidden under about three inches of snow. That this decayed sidewalk was the cause of the accident. That there was no contributory negligence in the way plaintiff approached the main road nor in the way he loaded his sleigh. That Clatworthy was not liable. Judgment against the municipality for $1,250 and costs. Action against Clatworthy dismissed with costs.

Contract for Construction of Municipal Works.—O'Donnell vs. the Township of Widdifield. Defendant municipal council called for tenders for certain work amounting to $20,000. Plaintiff put in a tender, which he claimed was accepted by the council, and an agreement made between them for the carrying out of the work. He brought action claiming $10,000 damages for breach of contract and to recover $200 for work performed. It was held that no by-law was passed by council awarding the contract to the plaintiff or authorizing the making of it; nor was the contract an executed contract, and the defendants in no way became bound by acceptance of the benefits thereof. That, as the plaintiff admitted that whatever work he did for defendants was done to "test them out," the action should be dismissed, but in view of the circumstances surrounding the holding of what was intended as a meeting of the township council, and of the irregularity and want of care shown in dealing with a matter of such importance to the municipality, the dismissal of the action should be without costs.

Building Restrictions: Erection of Apartment House.—Robertson vs. Defoe was a motion by the purchaser in respect to his objections to the title of certain property upon which he wished to erect a 3-suite apartment house and where he thought building restrictions prohibited the erection of such a building. The vendor's title was subject to the following building restrictions: "(1) No attached nor semi-detached house shall be permitted, and one detached, three-suite dwelling house and no more and not more than three storeys in height, with or without suitable coach-houses, out-houses and stabling . . . may be erected and standing at any one time on any one parcel of land having at least fifty-eight feet of frontage. . . . (2) No such building, nor the land appurtenant thereto, shall be used during said period for the purpose of any profession (save of a duly qualified doctor or dentist), business, trade, sport or employment, or for any purpose which might be deemed a nuisance, but may be only used for residential purposes." Chief Justice Meredith held that these restrictions did not prevent the purchaser from erecting a three-suite apartment house, having but one main entrance: that the occupation of the three suites as separate residences could not be deemed a nuisance. (See also Robertson vs. Defoe in this issue).

Failure to Prevent the Erection of an Apartment House.—Judgment based upon that given in the action Robertson vs. Defoe, narrated elsewhere in this department, was given by Mr. Justice Middleton in the case of Pearson vs. Adams, which was a motion by the plaintiff for an injunction restraining defendant from erecting an apartment house upon certain lands on Maynard place, Toronto, in alleged breach of the provisions of a conveyance which stipulated that the lands were "to be used only as a site for a detached brick or stone dwelling-house." In giving judgment for the defendant the Honorable Mr. Justice Middleton said: "Apart from authority, binding upon me, I would have thought that an apartment house such as the defendant contemplates erecting could not be described as 'a detached dwelling-house.' I would have thought it clear that the building was, in truth, a series of separate buildings, attached, and separated by the one main perpendicular wall and the two horizontal partitions. But this, as I understand the case of Robertson v. Defoe, is not the law here, and yielding to the authority of that case, there is no alternative save to dismiss the action with costs. I do not think I should attempt to refine away that decision by making distinctions without any difference.

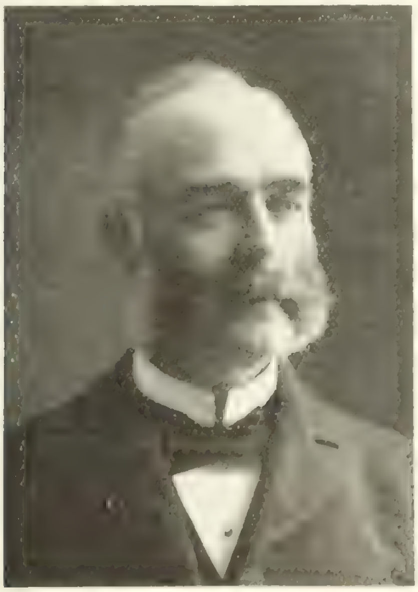
"I think it better to adopt this course, and leave it to the plaintiff to take the case to a higher Court."

Canadian Consulting Engineers

Mr. William Kennedy, Jr., Mem. Can. Soc. C. E.

TO a considerable extent, the progress of Canadian industries has been bound up with the development of her water powers and the employment of electrical energy. We are now alive to the possibilities of the Dominion's enormous resources in this direction, and we are daily adding to the facilities for utilizing these powers. There is probably no man in Canada who has taken a bigger share in this work that Mr. William Kennedy, Jr., of Montreal, hydraulic and mechanical engineer. He was born at Charleston Mills, near Brockville, Ont., in 1848, of Scottish parentage. His father, Mr. William Kennedy, was a contractor and millwright, and about 1860 established the firm now known as William Kennedy & Sons, Ltd., at Owen Sound, Ont.

Mr. Kennedy, after leaving the Grammar School, worked in his father's business, but in 1873 left home for Ottawa.



Mr. William Kennedy, Jr., Montreal

There he was employed on the water works under Mr. T. C. Keefer, C.E., C.M.G., a well known civil and hydraulic engineer, who is still living and who is over [illegible] years of age. Three years later, when Mr. Keefer retired from the construction of the works, Mr. Kennedy was appointed superintendent and manager, and retained the position until 1879. In that year he returned to Owen Sound and became interested in his father's business, which was then carried on under the name of William Kennedy & Sons. At the same time he did a large amount of hydraulic and engineering work.

Mr. Kennedy, without early scientific training, was quick to see the possibilities of the development of Canadian water powers. Much of the mechanical side of the work he acquired in the course of his father's business, but he added theoretical and scientific knowledge by study at nights. The result was a growing practice in the early days, when we were just beginning to realize the importance of hydro-electric plants and when municipal authorities, owing to growth in population, were installing waterworks systems.

With increasing work, Mr. Kennedy decided to remove to Montreal in 1892, still retaining some connection with the Owen Sound firm. Five or six years ago, however, he decided to give up this interest and devote himself entirely to engineering work.

We cannot give a detailed list of the schemes in which Mr. Kennedy has been interested, either as actual or consulting engineer, but we may mention that he was engineer for the construction of a dam and power house for the Peterborough, Ont., Waterworks Company; waterworks for the town of Niagara Falls, Ont.; Calgary Water Company, Calgary, Alta.; the corporation of New Glasgow, N.S.; Welland, Ont.; Morrisburg, Ont.; Hawkesbury, Ont.; Owen Sound Water Co., Owen Sound, Ont. In connection with some of these towns, Mr. Kennedy also laid out and built sewer systems.

In conjunction with his brother, Mr. John Kennedy, now consulting engineer for the Montreal Harbor Board, he constructed a stone and rock-filled dam across the Winnipeg River at Keewatin, Ont. He was also hydraulic engineer for the Kaministiquia, Ont., Power Company's plant at Kakabeka Falls, which supplies power to Fort William and Port Arthur, and partly built the power works for the Stave Falls Power Company, near Vancouver, which are now acquired by the Western Power Company. Other projects which were under his charge were the hydraulic end of the Hamilton Cataract Power and Transmission Company's works near St. Catharines, Ont., developing about 50,000 horse power; and the hydro-electric power works for the Ottawa and Hull Power Co., at Hull, designed to develop 10,000 horse power. Acting with Mr. J. B. McRae, of Ottawa, he designed and built a big dam at the Chaudiere Falls, for all the water power interests at Ottawa and Hull.

In addition to acting for power companies and municipalities, Mr. Kennedy has done a large amount of work for private firms and individuals. He superintended the overhauling of the water power developments for the Eddy Company at Hull, P.Q.; constructed the hydro-electric power for Senator Edwards at New Edinburgh, Ottawa; built the water power for the St. Raymond Pulp and Paper Mills, at St. Raymond, P.Q.; the James MacLaren Company's hydraulic power at the large pulp mills, Buckingham, P.Q., and also for the Lake of the Woods Milling Company's mills at Keewatin, Ont.

For four years Mr. Kennedy has been consulting engineer to the city of Winnipeg in connection with the hydraulic and general engineering work of the municipal power plant, and he has been retained in a similar capacity for the extension of the gravitation system of waterworks at New Glasgow, N.S. In addition to a large practice in consulting work, he has also acted in many arbitration cases and law suits.

Two years ago he visited Porto Rico and Cuba, and reported for a syndicate on a means to enlarge hydro-electric development at San Juan, Porto Rico, and in Cuba on a proposed power plant. He has also visited Europe four times, particularly in connection with the purchase of turbines, and has inspected many of the largest plants in italy, Austria, Switzerland and Germany.

Messrs. [illegible] & Company, of Moose Jaw, Sask., have contracts on hand involving an approximate expenditure of $100,000. Their principal work is the laying of sewers and water mains and the construction of a subway under the C. P. R. tracks at Moose Jaw. The subway is 66 feet clear between walls and is paved with vitrified brick. It has a double street car line and provision is made for five C. P. R. tracks. The walls are constructed on top of 18-foot piles. The subway is constructed below water line, making cofferdams necessary until the walls are built. About one hundred men and twenty-five teams are employed by the company.

Personal Mention

Messrs. [illegible] and Watson have registered a building partnership at Montreal. Another new Montreal registration is that of Messrs. Laflamme and Bedford.

Messrs. A. L. Joyce, E. J. Cooper-Smith, and Geo. Had[illegible] have commenced business as The Contractors Supply and Convenience Company, at Room 26, 207 St. James street, Montreal.

The Toronto Board of Control have retained Mr. E. A. James to report upon the Island wells scheme in connection with the work that is being undertaken by Mr. Jos. Harvey, of Greensville.

Mr. Paul Barnard, supervisor of track of the Chesapeake & Ohio Railway, at Richmond, Ind., has resigned to accept a position in the engineering department of the Grand Trunk Pacific Railway at Port Arthur, Ont.

Mr. Paul Seurot has been appointed Canadian representative of Jacobs & Davies, Inc., consulting engineers, of New York City and London. The Canadian headquarters of the firm will be at 263 St. James street, Montreal, Que.

Mr. A. E. Foreman, a graduate of McGill University, and formerly secretary and manager of the Concrete Engineering and Construction Company, Limited, has been appointed Chief Assistant to City Engineer Rust at Victoria, B.C.

Mr. R. C. Harris, Toronto's newly appointed Works Commissioner, was presented last week with a cabinet of silver by the employees of the Property Department, of which he was chief. Mr. Harris paid a warm tribute to the loyalty and good work of his former staff.

We recently had word from Mr. C. H. Hollingsworth, formerly superintendent for Messrs. O'Toole & McGillaroy, Ottawa, but now chief engineer and general superintendent of tunnels for the Mexican Light & Power Company. At the time of writing Mr. Hollingsworth was stationed at San Lorenzo de Tepeixco, Puebla, Mexico.

Mr. R. C. Harris, Works Commissioner for the city of Toronto, was duly sworn into his new office last week by the city solicitor, after which he assumed his new duties in the office formerly occupied by City Engineer Rust. The control of the Property Department has been placed in charge of Mr. A. G. McGraw, pending the appointment of a new official.

Messrs. W. Rutherford, of William Rutherford & Sons Co. Ltd., R. H. McMaster Steel Company of Canada; W. J. Sadler, Sadler & Haworth; T. F. Howard, Phoenix Bridge & Iron Works, Ltd., and F. H. Hopkins, Dominion Wire Rope Manufacturing Co. Ltd., are among the executive committee of the Montreal branch of the Canada Manufacturers' Association.

Mr. D. H. Burnham, past president of the American Institute of Architects and the designer of many notable buildings in the United States, died at Heidelberg, Germany, on June 1. The late Mr. Burnham was architect and director of works of the World's Columbia Exhibition at Chicago, 1892-1893. In recent years he had devoted much painstaking study to civic improvement work.

Construction News and Notes

Saskatoon Builders, Limited, have obtained a charter with a capital of $50,000. Their head office will be at Saskatoon.

A by-law to raise $1,000,000 for harbor and civic improvements at new Westminster, B.C., is being promoted actively.

The Canada Brick & Fireproofing Company, Limited, is a new Toronto concern capitalized at $500,000. The directorate includes Messrs. K. McWhinney, Herbert Stinson and E. E. McCraken, all of Toronto.

Vancouver will have a new supply firm in the Dominion Equipment & Supply Company, which has been incorporated with a capital of $100,000.

Messrs. C. M. Garvey, W. H. Price and E. Braden are the provisional directors of the Canadian Marble Company, Limited, Toronto, incorporated with a capital of $100,000.

The city of Toronto may find it hard to fix responsibility for non-compliance with the building regulations. At the present time copies of the building by-law are out of print and the proposed new by-law has not yet been passed.

The staff of City Architect McCallum, of Toronto, has been augmented by the appointment of two engineers and three inspectors. The appointments are understood to have been brought about by the criticism of the department made in connection with the Neilson Building collapse.

The proposed new building by-law for the city of Victoria, B.C., which has been prepared by a special committee composed of members of the city council, the Builders' Exchange and the Architects' Association, has been submitted to the city council and is now under consideration.

Mr. George Powell, Acting City Engineer of Toronto, has reported in favor of the construction of extensions to the filtration plant involving an estimated expenditure of nearly $900,000. It is probable that a by-law to raise the necessary funds will be submitted to the ratepayers next January.

Among recent orders received by the Smart-Turner Machine Co., Ltd., of Hamilton, Ont., may be mentioned one from Wettlaufer Bros., Hamilton, Ont., for a centrifugal pump; for a duplex pump from the Western Construction Co., Courtright, Ont.; and from the Corporation of Dauphin, Man., for an Underwriter fire pump.

The city council of Toronto, Ont., has passed a resolution authorizing Mr. L. H. Drayton, Corporation Counsel, to secure a railway expert as an official to be attached to his department for street railway traffic purposes. The resolution also provides that funds to the extent of $35,000 be provided for the securing of expert assistance required in connection with transportation matters, such expert or experts to be residents of Canada.

The City of Montreal have accepted the tender of $34,000 of John Quinlan & Company for improving the historical Champ de Mars. The improvements call for the construction of retaining walls, stone balustrades, and three stone stairways from the Craig street side. Clusters of electroliers will encircle the field. All wooden stairs and steps will disappear and the enclosure will be converted into a public place in keeping with its surroundings.

A deputation from British Columbia waited upon the Right Hon. Mr. Borden last week urging the construction by the Dominion Government of a bridge across Seymour Narrows to connect Vancouver Island and the mainland. It was suggested that the government should build the bridge and charge rental to the railways using it. The Premier referred to the magnitude of the project, which is estimated to cost $20,000,000, and made no committal statement.

Catalogue S, which is being distributed by the Nelson Valve Company, of Chestnut Hill, Philadelphia, Pa., is a compact and well illustrated booklet which gives complete information pertaining to the company's steel valves and fittings. Its contents include descriptions of gate valves, globe valves, angle valves, vertical valves, cushioned non-return stop valves, cushioned non-return valves, check valves, throttle valves and blow-off valves—an assortment that will fill every requirement of the most modern high pressure plant. Valves are shown for superheated steam, as well as for high pressure saturated steam and for severe hydraulic work.

The Protestant School Commissioners of Montreal have accepted the tender of John Quinlan & Company for the foundation and excavation work of a new high school on University street. The price is $235,000, but it is probable that the total cost will be about a million dollars. The other tenderers were Reid, McGregor & Reid, $253,000; Mr. E. G. M. Cape, $281,000; P. Lyall & Sons Construction Company, $295,930, and the Geo. A. Fuller Company, Limited, $284,700.

Dominion Iron & Steel Company's Extensions at Sydney, N. S.

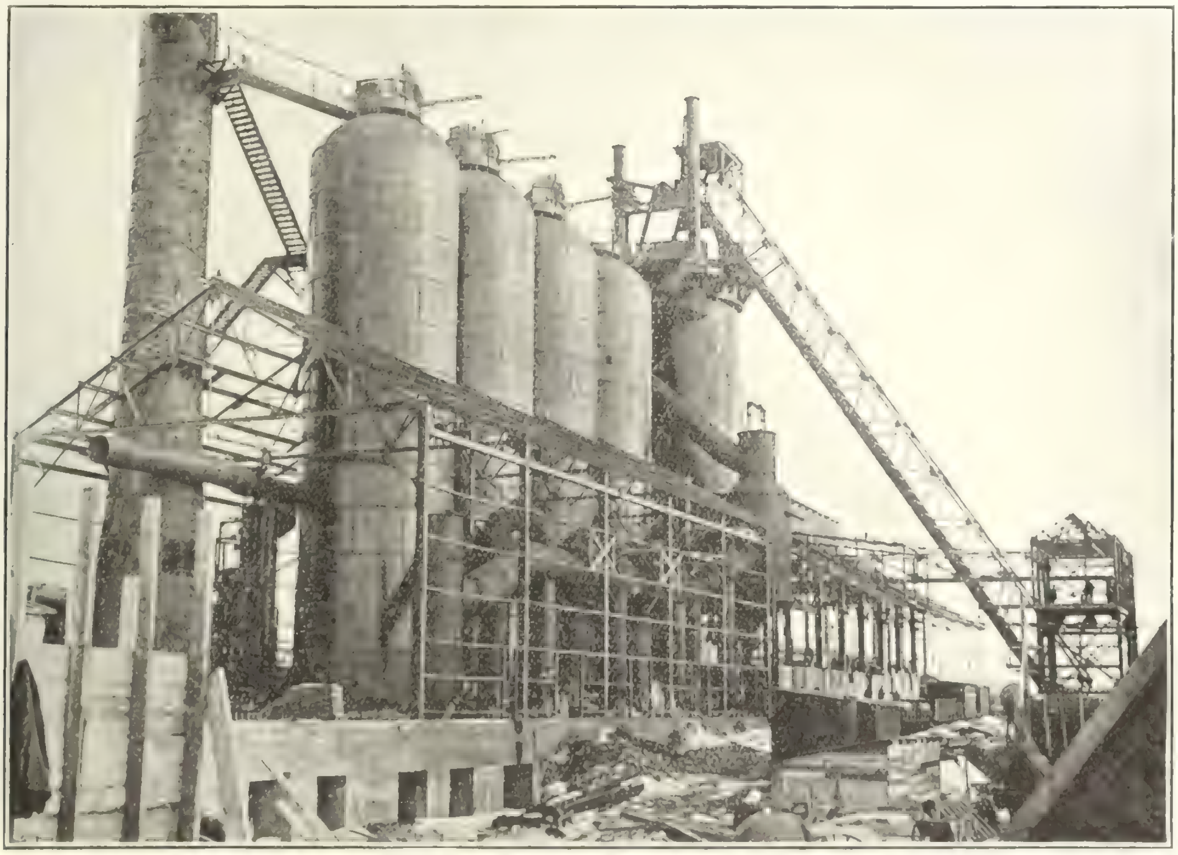
When the Dominion Iron & Steel Company decided to extend the iron producing portion of its plant it was decided to parallel the present blast furnaces, known as Nos. 1, 2, 3 and 4, with another complement of four furnaces some 400 ft. to the westward of the furnaces now operating. As all the plant units are numbered from the north to the south, it will explain how the fifth furnace of the installation was called No. 8, as the construction began from the southern end of the new plant addition.

The old plant was designed and constructed under the direction of Mr. Julian Kennedy, Pittsburg, during ten years of operation and has been more or less altered. With this information at hand, the Dominion Iron and Steel Company contracted with the Canada Foundry Company for the erection of the No. 8 furnace and at a later date for No. 7 furnace, which is the opposite end of No. 8 and of equal capacity.

The illustration shows the general view of the stack, stoves, stove shelter, furnace proper and cast house from the northwest side of the plant, including, also, a portion of the skip-way where it joins the bin system. This No. 8 furnace is the second furnace to be constructed in Canada by the Canada Foundry Company Limited, they having completed a contract for the construction of the furnace for the Atikoken Iron & Steel Company, at Port Arthur, some four years ago. The Canada Foundry Company has recently closed contracts for a portion of the work in connection with the new Canadian Furnace Company, Limited, at Port Colborne, Ont.

These facts clearly establish that this class of construction can readily be obtained in this country and those interested in this class of engineering work will find that Canada has ample facilities and skill for the execution of all work in connection with our metallurgical developments.

We hope to supplement this short article from time to time with other various details of interest in this connection and at an early date to furnish a complete description of the Dominion Iron & Steel Company's extensions to which reference is made above.



Dominion Iron & Steel Company's Extensions

A specially appointed civic improvement committee have submitted to Mayor Geary, Toronto, a report on the proposed Bloor street viaduct. The expenditure involved in their plan is two and a quarter million dollars.

The city of Toronto has voted an additional $30,000 to the Board of Highway Commissioners for York County, to provide good roads from the outskirts of the city into the county.

Western Pavers, Limited, 1004 McArthur Building, Winnipeg, have a number of contracts for paving work in Regina, Battleford, Saskatoon and Edmonton. The expenditure involved is approximately [illegible]. The company report that their operations have been hampered by a lack of cement at all points.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Kerrisdale, B.C.

[illegible] Pipe for Municipality of Point Grey. Tenders received by Clerk, H. Floyd, until June 24th. Plans at office of Engineers, Cleveland & Cameron, 506 [illegible] Bldg., upon payment of $10 deposit fee.

Paris, Ont.

Water Main. Inspector Wilson recommends the laying of a new main from the reservoir to the higher level, one and a half miles.

Roads. Chairman, R. Thomson, manager of Penmans, Ltd., was instructed at the last meeting to engage an engineer to inspect streets and in his report [illegible] plans for permanent work.

Port Arthur, Ont.

Paving. Tenders received by Utilities Commissioner, J. J. Hackney, until June 24th. Plans at office of City Engineer.

Walkerville, Ont.

Sewers, cost $6,000. Tenders called after June 11th for 2,493 feet of sewer. Plans at office of Engineer, Owen McKay.

Winnipeg, Man.

Conduit line. Tenders received by Board of Control until June 21st for 70,000 feet duct of single vitrified clay conduit for waterworks. Plans at office of Engineer, J. G. Glassco, 54 King street.

CONTRACTS AWARDED

Moncton, N.B.

Water main, cost $11,897.50. Chairman, Board of Works, S. O. Humphrey, City Hall. Engineer, J. Edington, Union street. General contractor, Ducity Le Blanc, Ste. Anselmn West Co., N.B.

Napanee, Ont.

Sewage disposal works, cost $30,000. Engineer, G. C. Wright, Kingston. Town Clerk, W. Grange. General contractor, Construction Service Co., Guelph.

Toronto, Ont.

Sewer. The Polson Iron Company were awarded the contract for a 46-inch steel pipe sewer on Sherbourne street at $8.56 per lineal foot. The second section of Garrison Creek sewer was not awarded the tenders being referred to the City Engineer for his report.

Railroads, Bridges and Wharves

Tp. of Ascot, Co. of Sherbrooke, Que.

Two bridges. E. A. C. Bourque, East Sherbrooke, Que., in charge of work. 35 ft. long, span concrete floors; will re- [illegible]

Brome, Que.

Bridge. Engineer, L. G. Vallee, Quebec, Que. The council are comparing decision is reached tenders will be called. Tenders will be received for a 30 ft. bridge by G. F. Hall, secretary, Brome.

Bruce Tp., Ont.

Bridge. Tenders received by Clerk, J. J. McKay, Underwood, Ont., and plans may be obtained at his office.

Calgary, Alta.

Car barns, cost $8,500, Victoria Park. Architect, City Engineer. Two stys., 66 x 45, brick construction. Plans ready. Work to be done by day labor.

Tp. of Mountain, Ont.

Concrete and grading work over Van Camp Creek. Tenders received by Engineer, F. M. Eagleson, Winchester, Ont., until June 29th. Plans at his office.

Needles, B.C.

Wharf. Tenders will be received by Secretary, R. C. Desrochers, Ottawa, Ont., until July 4th. Plans at office of Dept. of Public Works, Ottawa; C. C. Worsfold, district engineer, New Westminster, B.C., Postmasters, Needles and Victoria, B. C., and MacLean Daily Reports, Toronto.

Paris, Ont.

Dam for Town of Paris and Paris Wincey Mills Co. Manager, H. Stroud. The dam on the Nith destroyed by flood to be rebuilt.

Richmond, Que.

Railway station for Grand Trunk Railway. Hon. M. E. Bernier and staff of the Dominion Railway Commission have been here in connection with suitable location.

Yarmouth, N. S.

Wharf, etc., for Dominion Atlantic Railway Co. General manager, P. Gifkins. Extensions to wharf and spur line of railway planned.

CONTRACTS AWARDED

Aylmer, Ont.

Concrete arch bridge, cost $7,800. Engineer, J. A. Bell, St. Thomas. General contractor, E. E. L. Talbot, London Junction.

Between Grey and Wellington Counties, Ont.

Bridge. Engineers, Bowman & Connor, 36 Toronto street. John Langdon, Kenilworth, Ont., was awarded the contract for a 36-ft. concrete girder bridge at $7.20 per cu. yd.

Charlottetown, P.E.I.

Railway station, cost $30,000, for Federal Government, Ottawa, Ont. General contractors, Clark & Morrison. Brick construction work to be finished by September.

Toronto, Ont.

Freight terminal, cost $75,000, Simcoe, Wellington and John streets, for Canadian Pacific Railway. Architects, Hutchison, Wood and Miller, Royal Insurance Bldg., Montreal. One to five storeys, brick, reinforced concrete. Work to be carried out under the direction of the Superintendent of Building Construction of C. P. R., F. L. Ellingwood, 485 St. Catherine street west, Montreal, or site of work.

York County, Ont.

Concrete Arch Bridge, cost $6,800. Engineer, Frank Barber, 57 Adelaide St. E. General contractors, Lewis Construction Co., Toronto, will start work immediately on bridge over a branch of the Don on the Town line Concession 3, between the Townships of York and Markham, County of York.

Public Buildings, Churches, Schools, etc.

Barrie, One.

Addition and alterations to public building. Tenders will be received by Secretary, R. C. Desrochers, Dept. Public Works, Ottawa, until June 27th. Plans at offices of T. Hastings, Clerk of Works, Postal Station F, Toronto. Post Office, Barrie, Dept. of Public Works, Ottawa and MacLean Daily Reports, Toronto.

Chatham, Ont.

Hospital extension, cost $4,000, for Public General Hospital Board. Architect, S. G. Kinsey, Two storeys and basement, 30 x 40, brick and frame. Tenders called.

Duck Lake, Sask.

School, cost $6,000. Secretary-treas., W. Urton. 30 x 48, brick and stone construction. Plans in preparation.

Gananoque, Ont.

Armoury. Tenders received by Secretary, R. C. Desrochers, Ottawa, until June 22nd, Plans at his office and Postmaster, Gananoque.

Halifax, N.S.

Alterations to Mumford Market. Arthur C. Theakston, 100 Hollis street, has purchased above property and the present brick building will be overhauled and put in good repair. The frame buildings removed and replaced by brick structures.

Hamilton, Ont.

Sunday school for Kensington Avenue Methodist Church, E. Hamilton. Pastor, Rev. W. M. Corkery, 160 Avondale ave. Plans under consideration.

Masonic Temple. New building contemplated; the matter is in the hands of F. J. Howell, care Howell Lithographing Co., Vine street, who will supply further information required.

Humbolt, Sask.

Interior fittings for post office. Tenders received by Secretary, R. C. Desrochers, Ottawa, Ont., until June 24th Plans at office of W. Driver, Clerk of Works, Humbolt; W. T. Mollard, Clerk of Works, Regina, Dept. Public Works, Ottawa.

Melita, Man.
School, cost $6,000. Brick veneer. Plans ready and tenders called shortly.

Moose Jaw, Sask.
City Hall annex. Tenders received by City Commissioners, A. W. Mayberry, L. W. Rundlett and W. F. Heal, until June 20th. Plans at office of Architect, R. G. Bunyard.

North Keppel, Ont.
School. Tenders received by Secretary, Geo. Cameron, until June 24th for the erection of building on White Cloud Island. Plans at North Keppel Post Office and the Canadian Echo Office.

Paris, Ont.
Parish house, cost $5,000, for St. James Church. Architects, Taylor & Taylor, Brantford. Wardens, E. Pitts and G. E. Featherstone. Plans to be submitted to the vestry; if approved tenders will be called.

Extension to post office and clock tower. Secretary, R. C. Desrochers, Department of Public Works, Ottawa, has sketch plans prepared.

Red Deer, Alta.
Municipal offices. Tenders received by architect, C. A. Julian-Shannon, Red Deer, and also Barns & Gilby, Edmonton, Alta. Two storeys and basement, 30 x 63, brick veneer, B. C. fir floors.

Starbuck, Man.
School, Section 98, 2 West. Tenders received by Sec.-Treas., Wm. Allinson, until June 21st. Plans at his office.

St. Louis De Courville, Que.
Church. Stone construction. For further information write His Lordship Monseigneur Roy, Quebec City.

Toronto, Ont.
Picture theatre, [illegible] of Keele street, for W. L. Joy, Dundas street. Architects, Redmond & Beggs, Kent Building. Two storeys, brick, reinforced concrete. Tenders received by architect close July 15th.

CONTRACTS AWARDED

Calgary, Alta.
Masonic hall, [illegible] Masons, 2nd ave. east. Architect, Mr. Bennett, Calgary. General contractor, S McDonald, [illegible] x 69, brick [illegible]

Dartmouth, N.S.
Hospital, cost $80,000, for Provincial Government of Nova Scotia. President, Commissioner of Works and Mines, Hon. E. H. Armstrong. Architect, Herbert E. Gates, Telephone Building, Hollis street, Halifax. General contractors, F. A. Ronnan & Co., 16 Prince street, Halifax. Painting and glazing, Walsh Bros., Halifax. Plumbing, [illegible] & Co., Sackville street, Halifax. Iron work, Hillis & Sons. Three storeys wings, one storey, 328 x 30, brick and stone. Complete hospital equipment will be purchased.

High River, Alta.
School, cost [illegible]. General contractors, Adams & Weiss, High River. Plumbing and heating, J. C. McIndoe, High River. Two storeys, 48 x 58, cement and brick construction. Sec., Norman Young; chairman, R. Skav.

Melfort, Sask.
School, cost $50,000. Architect, W. W. Lachance, Saskatoon. General contractor, A. Kennedy, Saskatoon. Two stys., brick and stone construction.

Melville, Sask.
Town hall, cost $55,000. Sec.-Treas., John Crow. General contractors, Melville Construction Co. Building to be ready for occupation in January, 1913.

New Westminster, B.C.
School, cost $32,150, 7th ave. General contractor, Wm. Forrester. Architects, Gardiner & Mercer. Electrical, Parker Chace Co. Plumbing and heating, James Murphy. Iron work, J. McMurphy. 3½ storeys, stone, brick and concrete construction.

Red Deer, Alta.
Extension to convent school, cost $15,000, for Le Corporation Episcopale. Architect, A. D. Turnbull, Red Deer. Priest in charge, Rev. H. Voisin. General contractor, Evan Roberts, Red Deer. Plumbing and heating, Smith & Gaetz, Red Deer. Three storeys, 33 x 35, brick.

South Porcupine, Ont.
Lockup for the Provincial Government, Dept. Public Works. Secretary H. F. McNaughton, Toronto. General contractors, H. Hickey and A. Hawley, Peterboro, Ont.

Stoughton, Sask.
Town Hall, cost $8,000. General contractor, E. Doolittle, Forget, Sask. Two storeys, 26 x 52, brick veneer.

Toronto, Ont.
New Institute, cost $30,000, Emily St., for St. Andrews Presbyterian Congregation, Simcoe and King streets. Architects, Curry & Sparling, 90 Yonge St. Mason, Jas. A. Wickett, Ltd., 678 Broadview ave. Carpenter, Wm. Munro & Son, 76 Spadina ave. Plastering, W. J. Hynes, 16 Gould street. Roofing, Robert Rennie, 130 Dupont street.

College building, cost $150,000, St. George St. for Knox College. Architects, Chapman & McGiffin, 59 Yonge St. Mason, H. N. Dancy & Son, 220 [illegible] Carpenter, Thos. Painter & Son, 333 Huron st. Plastering, Hoidge & Sons, 34 Price street. Structural steel, Canada Foundry Co., Ltd., King and Simcoe streets. Cut stone, Geo. Oakley & Son, 278 Booth ave. Four storeys, 200 x 160, stone construction.

Residences

Brantford, Ont.
Residence, [illegible] for C. D. Forbes, Hespeler, Ont. Architects, Taylor & Taylor, Brantford Two storeys, 40 x 37, brick construction. [illegible]

Calgary, Alta.
Residence, cost $4,000, 15th street W., for W. S. McDonald, Box 1157. One and a half storeys, [illegible] Plans ready.

Fort William, Ont.
[illegible] Two and a half storeys, brick and stone. Tenders called.

Hamilton, Ont.
Twelve apartments, cost $15,000, James and Forest ave., for Dr. C. I. Kelly, 265 Bay street. Architects, Watt & Blackwell, Lister Bldg., have plans in preparation.

High River, Alta.
Residence, cost $5,000, for E. R. Wilder. Two storeys, 34 x 34, brick veneer. Foundation in.

Montreal, Que.
Residence, cost $5,500, Harvard St., for Jno. A. Little, 32 Wellington street. General contractor, M. B. Shaw, 151 Metcalf street. Three storeys, 28 x 45.

Residence, cost $3,800, for Reo. J. Fulcher, Hudson, Que. Architects, Peden & McLaren, St. Alexis. General contractor, Mr. Lombarde. Two storeys, brick. Tenders open.

Ottawa, Ont.
Residence to cost $6,000, Echo Drive, for R. K. Claire, 230 Clemow ave. 26 x 38, brick veneer. Plans in preparation.

Residence, cost $4,000, Centre street, for Wm. Austin, 109 York street, 24 x 35, brick veneer. Plans considered.

Residence, cost $4,000, Florence St., for Thomas Smith, 145 Sparks street, 35 x 39, double brick veneer. Plans in preparation.

Residence, cost $3,000, for Richard Lake, 270 Slater street. 22 x 28, brick veneer. Plans in preparation.

Addition to residence, cost $3,000, for J. A. Thompson, 136 Gloucester street. Plans in preparation.

Residence, cost $10,000, Frank street, for A. M. Power, 373 Nelson street, 85 x 33, brick and stone. Plans in preparation.

Toronto, Ont.
Residence, cost $6,000, High Park Blvd., for R. W. Prittie, 1 High Park Blvd. Architects, Designing & Draughting Co., 36 Toronto street. 2½ storeys, 30 x 38, brick and stone. Tenders open.

Residence, High Park Blvd., for Geo. F. Wolfe, 28 High Park Blvd. Architect, J. J. Gibson, Janes Bldg. Plans ready.

[illegible] East Roxborough street, for Mr. A. C. Knight, 170 Isabella street. Architect, C. J. Gibson, 75 Yonge street. 2½ stys., brick. Plans ready.

Alterations to residence, Cor. Huntley street and Elm ave., for Branksome Hall, Cor. Selby and Sherbourne streets. Architects, Designing and Draughting Co., 36 Toronto street. Two storeys, stone and brick. Plans in preparation.

Residence for A. W. Croft, 31 Maple ave. Architect, C. J. Gibson, Janes Bldg. Brick construction. Plans drawn.

[illegible] for W. N. Cronk, 469 Bathurst street. [illegible] Plans drawn.

Addition [illegible] 49 Brunswick ave., for Sisters of St John, [illegible] storeys, brick. Plans ready.

Four pair semi-det residences, cost [illegible] Palmerston Blvd. Architect, F. H. Emney, 79 Adelaide street east. Two and a half storeys brick. Tenders received by owner.

Residence, cost $3,800, 253 Dupont St., for J. Phinnemore, 502 Brunswick ave. Architects, Symons & Rae, 15 Toronto street. Two storeys, brick. Plans ready.

Residence, cost $8,000. Owner and contractor, J. D. Young & Son, 160 Rusholme road. Tenders for sub-contracts received by owner. Three storeys, 30 x 38.

One pair semi-det. dwellings, cost $5,000, Garnock ave, for A. & A. Grant, 860 Logan ave. Architect, P. H. Finney, 79 Adelaide street east. Two and a half storeys, brick. Plans ready.

Residence, cost $8,000, for J. D. Young & Son, 160 Rusholme road. Tenders for sub-contracts received by owner. Three storeys, 30 x 38, brick and stone.

Residence, cost $5,000, Oakwood ave., for Geo. E. Case, 296 Indian road. Two storeys and attic, 28 x 48, stone and brick. Plans ready.

Residence, cost $3,000, Cor. Sullivan and Beverley streets, for J. L. Gordon, 327 Queen street west. Architect, Len. Foulds, Cor. Leader Lane and King St. Two storeys, brick. Plans ready.

Two pr. residences, cost $6,000, Ossington ave. near Dupont street, for H. F. Squires, 520 Palmerston Blvd. Architect, W. C. Mason, 358 Montrose ave. Two and a half storeys, brick. Tenders open.

Residence, cost $3,000, 90 Fairview ave., for F. K. Mayhew, 385 Pacific ave. Architect, P. R. Wright, 332 Clendennan ave. Two storeys, brick. Plans ready.

Three attached residences, cost $5,000, 149-153 Greenwood ave., for H. C. Johnston, 509 Palmerston ave., architect and builder. Two storeys, brick. Plans ready.

Residence, cost $3,000, W. S. Temple ave., for G. A. McTaggart, 268 Dovercourt road, builder. Architect, P. H. Finney, 79 Adelaide street. Two and a half storeys, brick. Plans ready.

Westmount, Que.

Residence, cost $7,000, Roslyn ave., for N. T. Gagnon, Board of Trade. Brick, hollow tile and concrete construction. Plans in preparation.

Winona, Ont.

Residence, cost $3,500, for Dr. Herbert Wallace. Architect, H. New, 28 James street south, Hamilton, Ont. Plans prepared and tenders to be called shortly.

Winnipeg, Man.

Residence, cost $3,000, for Jas. M. Finlay, 613 McIntyre Block. Two stys., 24 x 32. Plans ready.

Four residences, cost $20,000, Dorchester street, for A. Simpson, care Simpson, Whyte Realty Co. Two and a half storeys, 30 x 34, brick and stone. Plans ready.

Three residences, cost $15,000, McMillan ave., for C. H. McFayden, care Western Mercantile Co., Ltd. Two and a half storeys, 30 x 26, stone construction. Plans ready.

CONTRACTS AWARDED

Calgary, Alta.

Residence, cost $12,000, Mt. Royal, for W. M. Gilfoy, 240 12th ave. west. Architect, R. B. Whitten, Beveridge Block. General contractor, Colander, 108 3rd ave east. Two storeys, 50-4 x 47-10, frame and stucco.

Residence, cost $5,000, Mt. Royal, for J. Carson. General contractors, Alliance Investment Co., 711 1st street west. Two storeys, 30-6 x 33-10.

Residences, cost $4,000, Rosevale, for E. P. Stavert. General contractor, T. Montgomerie, Box 485. Two storeys. 24 x 36,

Residence, cost $5,000, Mt. Royal. Owner and contractor, R. J. Burns, Box 1103. Two storeys, 35 x 36.

Two residences, cost $8,000, Mission street. Owner and general contractor, T. G. Whitehair, Box 1254. Two stys., 23 x 36.

Residence, cost $4,000, 13th ave. west, for Mrs. S. F. Southard, 1506 13th ave. west. General contractor, The Reliable Builders, Ltd., 511 1nd ave. west. Two storeys, 20 x 38.

Residences, cost $5,000, Mission street. Owner and contractor, A. C. Mabee, 27 Elma Block. Two storeys, 23 x 36, brick veneer.

Residence, cost $6,000, Houndsfield Heights, for C. A. Richardson, 1947 12th street west. General contractor, T. G. Whitehair, Box 1254. Two storeys, 32 x 28, brick veneer.

Two residences, cost $5,500, Rosevale. Owner and contractor, J. A. Knoepfli, 504 MacLean Block. Two storeys, 26 x 34.

Residence, cost $4,000, Sunalta, for J. McDonald, 809 15th street N.W. General contractor, A. Ingram, 809 15th st. N.W. Two storeys, 21 x 36, brick veneer.

Residence, cost $4,000, Mt. Royal, for Newcombes Ltd., 8th ave. east. General contractor, Swanstrom & Co., Travis Block. Two storeys, 40 x 28.

Residence, cost $5,000, Houndsfield Heights, for Newcombes Ltd., 8th ave. east. General contractor, Swanstrom & Co., Travis Block. Two storeys, 40 ft. 3 in. x 28 ft.

Residence, cost $9,000. Owner and contractor, A. F. Dawson. Two stys., 40 x 45, brick construction.

Cedardale, Nonquon Rd., Ont.

Residence, cost $10,000, for Frank Robson, Cedardale Leather Works, Oshawa. Architects, Ellis & Connery, Manning Chambers, Toronto. General contractor, R. H. James, Oshawa. Two storeys, brick and stone.

Hamilton, Ont.

Apartments, cost $15,000, for J. C. Sealey, 187 Bold street. Architects, Watt & Blackwell, Lister Bldg. R. Tope received contract to the amount of $10,000. Two storeys and basement, brick, cut stone and concrete construction.

Montreal, Que.

Residence, cost, $3,500, Jacques Hertel street. Owner and general contractor, Emile Robillard, 225 Hamilton street. Three storeys, 20 x 35, brick veneer.

Residence, cost $10,000, Redpath ave. for C. E. Gudewill, 256 Bishop street. Architects, Brown & Vallance, Canada Life Bldg. General contractor, J. H. Hutchison, 69 St. Ambroise street. Tiling, G. R. Locker & Co., 143 Mansfield street. Electrical work, Collyer & Brock, 131 St. Alexander. Carpenter, Geo. Roberts, 79 Lagauchetiere west. Painting and glazing, Murphy & Sons, 140 Mansfield street. Plumbing and heating, J. W. Hughes & Son, 367 Craig street west. Roofing, G. W. Reed & Co., Ltd., 37 St. Antoine. Two stys., 40 x 42, brick construction.

Residence to cost $6,500, for James Shea, 32 Rivard street. Architect, Dalbe Viau, St. Gabriel street. General contractor, Arthur Giroux, 915 DeMontigny street. Three storeys, 40 x 62, brick construction.

Residence, cost $3,000, Chambord St. Owner and general contractor, Clement Renaud, 471 Gilford street. Three stys., 25 x 38, pressed brick.

Residence to cost $3,500. Owner and general contractor, Clement Renaud, 471 Gilford street. Three storeys, 28 x 45, pressed brick.

Two residences, cost $10,000, 1589 Simard street, for Guiseppe Chiarelli, 32 Chateaubriand ave. General contractor, Antinio Travella, 52 Poupart ave. Two storeys, 50 x 47, pressed brick.

Residence, cost $4,000, Oxford ave. Owner and general contractor, Henry Gaffney, 204 St. James street. Two storeys, 30 x 38, brick.

Two residences, cost $13,000, Bordeau street, for G. Toupin, 257 Craig St. W. General contractor, A. Bouchard. Two storeys, 50 x 67, brick veneer.

Residence, cost $3,000, Melrose street. Owner and contractor, V. Lemire, 2618 Waverly street. Two storeys, 25 x 62, pressed brick.

Residence to cost $8,000 for R. Turcotte, 110 Parc Lafontaine. Architect, Zotique Trudel, 238 St. Andre street. General contractor, F. Bouchard, 112 E. Laurie ave. Three storeys, 25 x 62, stone construction.

Residence, cost $3,500, Davidson St., Owner and general contractor, Phillipe Heon, 231 Bourbouniere street. Three storeys, 25 x 45, pressed brick.

Residence, cost $5,000, Parthenais St. Owner and general contractor. W. Monastess, 256 Panet street. 26 x 54, brick veneer.

Extension to residence, cost $6,000, 927 Tupper street, for Mrs. F. B. Gilbert, 927 Tupper street. Architect, K. G. Rea, Beaver Hall Hill. General contractor, W. M. Irving, 6 Guy Block. Two storeys, 36 x 26, brick.

Two residences, cost $5,000, Cartier Street. Owner and general contractor, F. Pherrien, 324 Visitation street. 3-stys., 49 x 52, brick veneer.

Three flats, cost $4,000, Prefontaine street, for Jeremie Goyette, 378 Prefontaine street. General contractor, A. Tetrault, 73 Lafontaine street, Viauville. Three storeys, 25 x 36, stone faced.

Residence, cost $3,500, Cadieux St., for P. Meller, 1182 Cadieux street. Architect, Rene Charbonneau. General contractor, B. Semi, 775 St. Lawrence. Three storeys, 21 x 60, brick.

Two residences, cost $9,000, Cartier street. Owner and general contractor, T. Pelletier, 1024 Bordeau. Three stys., 25 x 40, brick.

Residence, cost $7,500, Marcil ave. Owner and general contractor, A. Wray 368 Prud'homme ave. Two storeys, 50 x 64.

Residence, cost $8,500, Mance street, for Octave Taillefer, 685 Notre Dame street west. General contractor, W. Tardif, 91 Adam street. Three stys., brick construction.

Two residences, cost $7,000, 408 St. Germain street, for J. M. Guilbault, 64 Rouville street. General contractor, Tel. Pageau, 408 St. Germain. Three storeys, 45 x 40, pressed brick.

Residence, cost $3,000, St. Dominique. Owner and general contractor, M. Cloutier, 151 Montcalm street. Two storeys, 25 x 35, brick.

Residence, cost $4,000, St. Dominique. Owner and general contractor, T. Clouthier, 107 Bouler. Two storeys, '35 x 39, pressed brick construction.

Two residences, cost $5,000, 471 Colonial ave., for A. Cohen, 557 St. Dominique. General contractor, J. Abramovici & Co., 102 Sherbrooke ave. Three storeys, 40 x 57, brick veneer.

Residence, cost $3,000, Joliette St. Owner and general contractor, Delphis Bouchard, 491 Cuvillier street. Three storeys, 24 x 35, pressed brick construction.

Residence, cost $4,500, Owner and general contractor, J. R. Brien, 1232 Chabot street. Three storeys, 25 x 60, brick and stone.

Residence, cost $7,500, Park ave., for A. Taillefer, 685 Notre Dame street west General contractor, W. Tardiff, 91 Adam street. Three storeys, 35 x 35, brick and stone.

Residence, cost $6,000, Old Orchard ave. Owner and general contractor, Arsene Campbell, Jr., 190 Selby street. Two storeys, 50 x 63, brick faced.

Residence, cost $10,000, Notre Dame street. Owner and general contractor, Jos. Dupuis, 82 Parc Cartier. Three storeys, 24 x 37, brick.

Residence, cost $3,000, Aylwin street, for Camille Brocher, 532 Joliette street. General contractor, Phillip Chauvin. 3 storeys, 24 x 37.

Residence, cost $4,800, St. Andre St. Owner and general contractor, Wilfred Maille, 2228 St. Hubert street. Two storeys. 25 x 45, brick and stone.

Residence, cost $6,000. Owner and general contractor, A. D. Morrow, 1152 Delorimier ave. Three storeys. 25 x 74, brick veneer.

Extension to residence, cost $8,000, for F. R. Wanklyn, 241 Drummond St. Architect, H. C. Stone. 84 St. Francis Xavier street. General contractor, Geo. Roberts. Lagauchetiere street. Three storeys, 42 x 40, brick and stone.

Residence, cost $3,000, Chateaubriand street. Owner and general contractor, Ovila Venne, 2151 Chateaubriand street. Three storeys, 25 x 52, brick veneer.

Fourteen residences, [illegible] Drummond Park, for City Realty Investment Co., Ltd. St. Catharines St. W. Two storeys, 21 x 31, brick and stone construction. Excavation started.

Residence, cost $6,500, Alma street. Owner and general contractor, Jean Gauthier, [illegible] construction.

Residence, cost $2,500, Valmont street, Owner and general contractor, P. H. Dumont, 3814 St. Denis street, Youville, Que. Two storeys, 28 x 30, stone construction.

Extensions to residence, cost $5,500, [illegible] Bleury street, for James [illegible] McGill street. Architects, House of Brown, 207 St. James street. General contractor, James Young, 7 McCullock ave. Three storeys and basement, 46 x 42, stone and brick.

Residence to cost $3,000, Palme street. Owner and general contractor, F. Tremblay, Cor. William and Guy Sts. Two storeys, 25 x 40, pressed brick.

Residence to cost $4,000, St. Urbain st. Owner and general contractor, Pierre Dubois, 13 Fairmount avenue. Three storeys, 25 x 60, stone veneer construction.

Flats, cost $10,000, Pine street. Owner and general contractor, D. Abel, 2159 St. Urbain street. Three storeys, brick veneer.

Residence, cost $7,500, Delanaudiere St. Owner and general contractor. Adolph Denault, 465 Garnier street. Three storeys, brick.

Residence, cost $4,500, 2681 Mance St. for J. B. Denteneer, 244 Sherbrooke St. E. General contractor, Arthur Chausse. Three storeys, 25 x 55, pressed brick construction.

Residence, to cost $3,000, Ballantyne. Owner and general contractor, J. H. Eccles, Westminster ave. Brick veneer construction.

Residence. cost $3,900, for A. F. Huch, Brock ave. General contractor, Mc. Lombarde. Two storeys,, brick veneer.

Residence, cost $4,000, Ainslie, for E. C. Kirkpatrick, Fennick ave. General contractor, J. J. Kirkpatrick, Montreal W. Two-stys., cement construction.

Ottawa, Ont.

Residence, cost $2,500, Carling street, for Albert McDonald. General contractor, John Stewart. Hilson ave., Ottawa. 24 x 28, brick veneer.

Residence to. cost $3,600, McKelley Townsite, for Mrs. E. R. Moore. Architect, M. C. Edey, 71½ Sparks street. Contractor, Block-Boyd Bros., Osgoode Station, Ont. Carpenter, R. Belaner, Clarence street. Painting and glazing. Ontario Decorating Co. Roofing, J. Sanderson, 553 McLeod street. Electric Wiring, A. Saguyn, electric engineer.

Red Deer, Alta.

Residence, cost $3,000, for Dr. B. Plaxton. General contractor, C. T. Eline. Two storeys, 24 x 30, frame.

Residence, cost $3,000, 1st street east, Parkdale, for Wm. Hammond. General contractors, Baird & McKenzie. Two storeys, 25 x 36-6.

Saskatoon, Sask.

Apartments, cost $23,000, McPherson ave. Owner and architect, D. Webster. General contractor, A. W. Bell, Saskatoon. Three storeys and basement, brick and stone. Tenders called for plumbing, heating and electric wiring.

Sherbrooke, Que.

[illegible] Joncas, 35 Alexander st., contractor. 3-sty., 37 x 40, brick construction. Private [illegible]

Sorel, Que.

Parsonage, for Rev. Mr. Tetrault. General contractor, M. Caron. Plan prepared and work to be started at once

Toronto, Ont.

[illegible] treet. Builder, G. S. Pringle, Beeton, Ont. Architect, J. G. Hedges, 86 Clinton street. Two storeys, stone and brick.

One pair detached residences, cost $6,400. Architect and builder, R. C. Vaughan & Son, Summerhill Gardens. 2½-storeys, 32 x 38, brick and stone.

Apartments, cost $8,500, St. Joseph street, for J. H. Young, 46 Grenville St., builder. Architects, Mallory & Thatcher, 31 Queen street. Mason, Earl Bros., 79 Duggan ave. Carpenter, W. T. Kincade & Co., 51 Cumberland street. Roofing, Carreys Ready Roofing to be put on by carpenter. Heating, Hamilton Stove & Heater Co., 155 King St. W. Plumbing and gas, J. E. Fullerton, 89 Concord ave. Electric wiring, J. Fallon, 31 Queen street west. Plastering, W. J. Haddock & Son, 792 Crawford St. Painting, Conlan Bros., 486 Yonge St. Two storeys, structural steel, brick and stone construction.

Residence, cost $6,000, for Dr. A. M. Bell, 360 Danforth ave. Architect, R. A. Abraham, 23 Jordan street. Builder, Thos. Brick, 716 Broadview ave. Two storeys and attic, brick.

Residence, cost $3,500, Edna avenue, Owner and builder, F. Brown, 24 Dorval road. Architect, F. H. Herbert, 65 Adelaide street. 2½ storeys, 23 x 38, brick.

Residence, cost $20,000, for Ontario Oddfellows Home, Davenport and Ossington ave. Architects, Thompson & Belfry, 43 Victoria street. Mason contractor, E. L. Forkes, 65 Lee ave. Carpenter, Adam Switzer, 48 Caroline. Two storeys, brick.

One pair semi-det. dwellings, Oakwood ave., for Geo. E. Case, 296 Indian road, architect and builder. Two stys. and attic, stone and brick. Plans ready.

Residence, cost $3000, Rusholme Park Crescent, for W. Wood, 9 Rusholme Crescent. Builder, Wood & Willis, 9 Rusholme Park Cres. 2½-sty., brick.

Six pair semi-det. residences, cost $19,200, E.S. Earlscourt near St. Clair ave., for F. A. Moore, Mimico Beach P.O., architect and builder. Two stys., brick. Plans ready.

Residence, cost $4,000, Westminster near Keele. Owner and builder, F. A. Ransom, 169 Grenadier road. 2½ stys., brick.

Residence, cost $2,700, Symmington ave. near Bloor street, for Geo. Baxter, 776 Dufferin street. Builder, W. J. Spanner, 118 Symington ave. 2½ stys., brick.

Vancouver, B.C.

Apartment bldg. cost $60,000, 10th ave. and Ontario street, for J. G. Chalmers. Architects, Perry & Nicholais, Pacific Bldg. General contractor, E. J. Ryan, 768 Granville street. Three storeys.

[illegible] T. H. Taylor, Vancouver. Architects, [illegible] ander street.

Vulcan, Alta.

Residence, cost $2,500, for E. J. Charters. General contractors, Greenlee & Smith. Two storeys, 24 x 30

Winnipeg, Man.

[illegible] for I. S. K. Weber, care Walch Land Co. Architect, Chas. S. Bridgman, Can

(Continued on page [illegible])

Tenders and For Sale Department

Special Notice to Contractors

[illegible] quantity of RE-LAYING RAILS or for REINFORCING [illegible] B. Shragge [illegible] 296 Princess Street, [illegible] 382, Winnipeg. 11-t.f.

REPORTER

[illegible] representative in each town in Canada to report on building and en[illegible] tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at [illegible] offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
[illegible] Pender Street

CITY OF PORT ARTHUR

Notice

Sealed separate tenders, endorsed on envelope, "Tender for Paving," will be received by the undersigned up to 5 o'clock p.m. of **Monday, June 24th, 1912**, for paving the following streets:

Cumberland Street—

Track Paving	sq. yards.	2,363
Roadway Paving	sq. yards	3,417
Curb and Gutter, straight	lin. ft.	1,980
Curb and Gutter, circular	lin. ft.	140

[illegible] Street—

Track Paving	sq. yards	684
Roadway Paving	sq. yards.	2,734
Curb and Gutter, straight	lin. ft.	1,340
Curb and Gutter, circular	lin. ft.	110

Further information as to plans, specifications, and form of tender may be obtained from the City Engineer.

A marked cheque for 10 per cent. of the estimated amount of the contract must accompany each tender.

The lowest or any tender not necessarily accepted.

J. J. HACKNEY,
Commissioner Utilities.

Corporation Offices, Port Arthur,
June 3rd, 1912 24-25

CITY OF MOOSE JAW,
SASKATCHEWAN

Tenders for Sewer and Water Extensions

Sealed tenders, marked "Tenders for Sewer and Water Extensions," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon on **Friday, June 28th, 1912**, for the laying of approximately 6¼ miles of 10-in. and 8-in. sewers and 6-in. water mains.

Plans, specifications and all information may be obtained from J. Antonisen, City Engineer.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, Sask., June 5, 1912. 24-26

Tenders Wanted

City of St. Catharines, Ont.

The Board of Works invite tenders for the construction of Berryman Avenue Trunk Sewer, consisting of approximately:

500 lin. ft. of 3-ft. dia. concrete-segment sewer in tunnel.
1,500 lin. ft. of 18-in. tile and cast iron sewer in open cut.
2,300 lin. ft. of 15-in. tile sewer in open cut, and relative works, manholes, chambers, etc.

Plans, profiles and specifications may be seen and form of tender obtained at subscribers' office. Tenders duly filled up and accompanied by accepted cheque for five per cent. of the amount to be lodged with J. Albert Pay, Esq., City Clerk, not later than noon on Wednesday, July 3rd.

Lowest or any tender not necessarily accepted.

R. D. BROWN, A.M. Inst. C. E.,
City Engineer.
St. Catharines, June 10, 1912. 24

Notice to Contractors

Tenders will be received by the undersigned for the substructures and superstructures of ten (10) bridges over the Fraser, Thompson and North Thompson Rivers on that section of the Canadian Northern Pacific Railway between Port Mann and the Yellowhead Pass, Province of British Columbia.

Tenders are to include any or all portions of the construction or the delivery of metalwork only.

Detailed drawings, specifications and forms of contract may be obtained on or after June 5, 1912, at the office of the Consulting Engineers, Waddell & Harrington, Winch Building, Vancouver, B. C., upon the payment therefor of fifty dollars ($50). This amount will be refunded to those who bid on the work, upon the return of the bidding papers in good condition.

Total work to be completed before June 1, 1913.

Tenders to be received at the offices of the undersigned, Metropolitan Building, 837 Hastings street west, Vancouver, B.C., not later than noon of July 8, 1912, and to be enclosed in sealed envelope marked "Tender for Bridge Construction."

The lowest or any tender not necessarily accepted.

MACKENZIE & MANN COMPANY, LTD.
24-25

Canadian Agents Wanted

Large United States firm manufacturing portable dumping boxes wants to secure reliable representatives in all parts of Canada. These portable dumping boxes, fitted to any wagon gear, will instantly convert them into first-class dumping wagons at one-third the usual cost. Apply Box 511, Contract Record, Toronto, Ont. 24-25

Stone Crusher Outfit

For sale, practically new Crusher outfit, comprising No. 5 and No. 3 Austin Gyratory Crushers, Elevators, Screens, shafting, etc. In service but a few months. We guarantee completeness and physical condition. Will sell with or without power plant. A decided bargain. Address,

WILLIS SHAW MACHINERY CO.,
39 South LaSalle Street,
t.f. **Chicago, Ill.**

CITY OF REGINA

Street Railway Materials

Sealed tenders, maked "Tenders for Street Railway Materials," will be received by the City Commissioners, Regina, Sask., up till noon, 12 o'clock, **June 24th, 1912**, for the supply and delivery, f.o.b. cas, Regina, of the following:—

(1) Street Rails and Accessories.
(2) Intersection Work.
(3) Overhead Materials.

A marked cheque for five per cent. of the bid must accompany each tender.

Lowest or any tender not necessarily accepted.

L. A. THORNTON,
24-25 City Commissioners.

To Contractors

Sealed tenders, endorsed "Tenders for Dormitory," addressed to the undersigned, will be received at this Department up to noon on **Wednesday, June 19th, 1912**, for the erection of a Dormitory Building (excepting heating, plumbing and lighting) on the grounds of the Institution for Deaf and Dumb, Belleville,

Plans and specifications can be seen at this Department and at the above Institution.

An accepted bank cheque, payable to the order of the Honorable J. O. Reaume, Minister of Public Works, for five per cent. of the amount of the tender and the bona fide signatures and addresses of two sureties or the bond of a Guarantee Company, approved by this Department must accompany each tender.

The Department will not be bound to accept the lowest or any tender.

By order,
H. F. McNAUGHTEN,
Secretary
Department Public Works, Ontario.
Toronto, June 5th, 1912.

Newspapers publishing this notice without authority will not be paid for it. 24-25

Concrete Mixer

For Sale—Cheap

Two-thirds yard Polygon Mixer, mounted with steam engine, boiler and charging hopper. In first class condition. Price $450 F.O.B. Columbus, Ohio. Write for particulars to Jaeger Machine Co., 216 W. Rich Street, Columbus, Ohio. 25-28

TENDERS

Whole or separate tenders will be received addressed to Henry White, Secretary Library Board, Port Hope, up till 12 o'clock noon, **July 5th**, for the several trades in connection with the erection of a library at Port Hope.

Plans and specifications may be seen at the Library Building, Port Hope, or at the office of the undersigned.

Lowest or any tender not necessarily accepted.

W. A. MAHONEY, Architect,
25 Telephone Bldg., Guelph.

CITY OF TORONTO

Main Drainage Works

Sealed tenders for the construction of Section No. 12, High Level Interceptor, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only up to noon of **Tuesday, July 2nd, 1912.** The work consists of the construction of about 2,757 lin. feet of 4-foot diameter circular brick or concrete sewer with connections.

Plans, specifications, forms of tender and other information may be obtained at the office of the Acting City Engineer, Toronto, Ont.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
July 2nd, 1912. 24-25

Township of Finch

Tenders Wanted

Sealed tenders, marked "Tenders for Drainage," also tenders marked "Tenders for Culverts," will be received by me, at the Township Hall, Berwick, until noon of **Wednesday, the 26th day of June, 1912**, for the construction of the Whissel Creek Drain, in the Townships of Finch and Cambridge.

Main Drain
Length 29,643 feet; excavation, earth, 7,744 cu. yds.; hard pan, 141 cu. yds.

Branch "A"
Length 774 feet; excavation, earth, 554 cu. yds.

Branch "B"
Length 8,331 feet; excavation, earth, 2,982 cu. yds.; hard pan, 46 cu. yds.; rock, 4 cu. yds.

Also the construction of nine concrete culverts on the above-mentioned drain.

Each tender shall be accompanied by a cash deposit or an accepted cheque on a chartered bank, in favor of the Treasurer of the Township of Finch, for a sum of $250 in the case of the Drainage Tenders, and a sum of $150 in the case of the Culvert Tenders.

The lowest or any tender not necessarily accepted

Plans and specifications may be examined, and forms of tender procured at my office, or at the office of Magwood & Stidwill, Engineers, Cornwall.

D. B. CAMERON,
Clerk, Tp. of Finch
Finch, June 12th, 1912. 25

TOWN OF ORILLIA

Extensions to

Sewerage System

Sealed tenders will be received up to 8 p.m. on **Wednesday, July 3rd, 1912**, addressed to C. E. Grant, Esq., Town Clerk, for the construction of approximately 16,200 lineal feet of sanitary sewers.

Plans, profiles and specifications are on file in the Town Engineer's office, Orillia, Ont.

The Corporation reserves the right to reject any or all tenders.

W. S. FROST, Esq., Mayor,
Orillia, Ont.

C. E. GRANT, Esq., Town Clerk,
Orillia, Ont.

W. K. GREENWOOD, Esq., B.A.Sc.,
Town Engineer,
25-26 Orillia, Ont.

Town of North Battleford

(Province of Saskatchewan)

Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on **Tuesday, July 2nd, 1912**, for the construction of a pump well. Offers will be received for a Steel Plate Well and for a Concrete Well.

Plans and specifications may be seen at North Battleford, or at the office of the Engineers, Toronto and Winnipeg.

No tender necessarily accepted.

J. GRIESE, Esq., Mayor.
H. W. DIXON, Esq., Secretary-Treas.
CHIPMAN & POWER, Engineers,
25 Toronto and Winnipeg.

Township of Finch

Tenders Wanted

Sealed tenders, marked "Tenders for Drainage," and "Culvert Tenders," will be received by me, at the Township Hall, Berwick, until noon of **Wednesday, the 26th day of June, A.D. 1912**, for the construction of the Steele-McElheran Drainage Improvement, in the Townships of Finch and Roxborough.

Steele-McElheran
Length, 6,221 feet; earth excavation, 3,642 cu. yds.; rock, 116 cu. yds.; hard-pan, 485 cu. yds.

Blair-McRae
Length, 12,600 feet; earth excavation, 2,227 cu. yds.; rock, 129 cu. yds.; hard pan, 485 cu. yds.

Also the construction of two concrete culverts, over the above-mentioned drain, on the Finch Roxborough Boundary.

Each tender shall be accompanied by a cash deposit, or an accepted cheque on a chartered bank, in favor of the Treasurer of the Township of Finch, for a sum of $250 in the case of the Drainage Tenders, and a sum of $50 in the case of the Culvert Tenders.

The lowest or any tender not necessarily accepted

Plans and specifications may be examined, and forms of tenders procured, at my office, or at the office of Magwood & Stidwill, Engineers, Cornwall.

D. B. CAMERON,
Clerk, Tp. of Finch.
Finch, June 12th, 1912. 25

Tenders for Bridge

Sealed tenders and marked "Tender," and addressed to Wm. Lane, Clerk County of Huron, Goderich P. O., Ont., will be received until **June 25th, 1912**, for the manufacturing and erection of a through steel highway bridge to be erected over the Maitland River at the Village of Auburn, Huron County.

Bridge to be designed according to Ontario Government specifications, 1911.

Length of span 140 feet; width of roadway 16 feet; distance from floor to bed of river 30 feet; about one mile from C. P. R. station.

Strain sheet and accepted cheque equal to 10 per cent. of contract to accompany tender.

The lowest or any tender not necessarily accepted.

Bridge to be completed on or before the first day of September, 1912.

D. PATTERSON,
25 County Commissioner,
Auburn, Ont.

Dated June 11th, 1912

Department of Railways and Canals

RIDEAU CANAL

Notice to Dredge Builders

Sealed tenders addressed to the undersigned and endorsed "Tender for Boom Dredge," will be received at this office, until 16 o'clock, on **Tuesday, the 25th June, 1912**, for a Boom Dredge required for the Rideau Canal.

Plan, specification and full information can be obtained upon application to the undersigned on and after this date.

The Department does not bind itself to accept the lowest or any tender.

By order,
L. K. JONES,
Secretary.
Department of Railway and Canals,
Ottawa, 11th June, 1912.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.—24144 25

Sealed tenders addressed to the undersigned, and endorsed "Tender for Addition and Alteration to Public Building, Barrie, Ont.," will be received at this office until 4.00 p.m. on **Thursday, June 27, 1912**, for the work mentioned.

Plans, specifications and form of contract can be seen and forms of tender obtained at the office of Mr. Thos. Hastings, Clerk of Works, Postal Station F, Yonge St., Toronto, at the Post Office, Barrie, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honourable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
[illegible]

Department of Public Works,
Ottawa, June [illegible], 1912.

Newspapers will not be paid if this advertisement is inserted without the authority of the Department.—[illegible]

Concrete Bridges

[illegible] M[illegible] D[illegible] Friday, June 28th, for the construction of five re-[illegible] concrete girder bridges for the County [illegible] Wellington, near Arthur.

[illegible] information [illegible]

BOWMAN & CONNOR, Engineers,
25 36 Toronto Street, Toronto, Ont.

Bridge Tenders

Sealed tenders will be received by J. W. Sutton, Esq., Court House, Guelph, up to 10 a.m. on **Saturday, June 29**, for the construction of
(a) 70 ft. x 18 ft. Steel Bridge at Rockwood.
(b) Concrete abutments for same.
(c) Reinforced Girder Bridge near Elora.

For plans, etc., apply to

BOWMAN & CONNOR, Engineers,
25 36 Toronto St., Toronto.

Bridge Tenders

Sealed tenders will be received up to noon on **Thursday, July 4**, by W. W. Scott, Esq., Township Clerk, Moorefield, for the construction of a steel bridge of 110 ft. span over the Connestogo River for the Township of Maryboro', also for concrete abutments for the same.

For plans and specifications apply to the Clerk or to

BOWMAN & CONNOR, Engineers.
25 36 Toronto Street, Toronto, Ont.

TOWN OF WATROUS
PROVINCE OF SASKATCHEWAN

Water Works, Sewerage Works and Concrete Sidewalks

Notice to Contractors

Sealed tenders will be received by the undersigned Secretary-Treasurer of the Town of Watrous for the following works:

Contract "A"—All labor and certain materials necessary for laying water pipes and sewers.
Contract "B"—All labor and materials necessary for the construction of Pump House.
Contract "C"—This contract will be subdivided as follows:—
1. Furnishing materials and labor for and erecting Water Tower.
2. Furnishing materials and labor for and constructing concrete foundation for Water Tower.
3. Furnishing material and labor for and constructing frame housing for Water Tower.
Contract "D"—Furnishing Cast Iron Water Pipes and Special Castings.
Contract "E"—Furnishing Gate Valves, Fire Hydrants, etc.
Contract "G"—Furnishing and erecting Pumping Machinery.
Contract "I"—Furnishing material for and constructing Collecting Galleries and Suction [illegible]
Contract "S"—Furnishing Sewer Pipes and Junctions.
Contract "T"—Furnishing labor and materials for Concrete Walks.

Tenders will be received until 8 p.m. on Monday, July 15th, 1912, for Contracts A, C, D, E, S and T.

And until 8 p.m. on Wednesday, July 31st, 1912, for Contracts B, G and I.

Plans, specifications, etc., may be seen at the Town Hall, Watrous, or at the Engineers' Offices, Winnipeg and Toronto, on or before July 1st, 1912.

No tender necessarily accepted.

RICHARD B. DAVIDSON, Esq.,
Mayor.
JOSEPH GAYE, Esq., Ses.-Treasurer.
CHIPMAN & POWER, Engineers.
25-27

Concrete Bridges

Sealed tenders will be received up to noon on Thursday, June 27, by Peter McLaren, Township Clerk, Ospringe, for the building of two reinforced concrete girder bridges of 26 and 32 ft. span for the Township of Erin.

For plans, etc., apply to J. W. Sutton, Reeve, Ospringe, or to

BOWMAN & CONNOR, Engineers.
25 36 Toronto Street, Toronto, Ont.

Tenders Wanted

Tenders addressed to the Township Clerk will be received up to Thursday noon, June 27th next, for the construction of about 900 feet of concrete breakwater on the Medway River in the 4th Concession. The total amount of concrete required about 600 cubic yards.

Specifications, forms of tender and instructions to bidders at the office of the undersigned.

The lowest or any tender not necessarily accepted.

ROBERT JACKSON, Reeve,
F. W. FARNCOMB, Consulting Engineer.
25 London, Ont.

Notice to Contractors

Tenders for Asphalt Wagons

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon Tuesday, July 2, 1912, for the supply of ten asphalt wagons, lined with steel and asbestos, and having a capacity of two cubic yards. All tenders must be f.o.b. Toronto, freight and duty paid.

Tenderers shall submit their own plans and specifications, and state date of delivery.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman Board of Control.
City Hall, Toronto,
June 13th, 1912. 25

CITY OF REGINA

Cast Iron Pipe and Specials

Sealed tenders, marked "Tenders fo Cast Iron Pipe, will be received by the City Commissioners, Regina, Sask., up till noon, 12 o'clock, **June 26th, 1912**, for the supply and delivery f.o.b. cars, Regina, of the following:—

Approximately 3,000 lin. ft. of 6-in. Cast Iron Pipe.
Approximately 1,600 lin. ft. of 8-in. Cast Iron Pipe.
Approximately 5 tons of specials.
To be delivered by July 10, 1912.
Also approximately 10,000 lin. ft. of 6-in. Cast Iron Pipe.
Approximately 3,000 lin. ft. of 16-in. Cast Iron Pipe.
Approximately 350 lin. ft. of 18-in. Cast Iron Pipe.
Approximately 1,700 lin. ft. of 24-in. Cast Iron Pipe.
Approximately 8 tons specials.
To be delivered by August 1st, 1912.

A marked cheque for five per cent. of the bid must accompany each tender.

Lowest or any tender not necessarily accepted.

(Signed) J. McD. PATTON,
24-25 Superintendent of Waterworks.

Tenders Wanted

for the erection and completion of a public school at Thornbury, Ont. Tenders will be received up to June 25 for the whole contract or for separate parts—carpenter work, brick work, cement work, painting and glazing, heating and ventilating. For plans and specifications apply

JOHN H. DICKINSON,
25 Sec.-Treas., Thornbury, Ont.

TENDERS

Napanee Sanitary Sewers, 1912

CONTRACT "C"

Sealed tenders will be received by the undersigned up till 12 o'clock noon, **Tuesday, June 25th, 1912**, for the completion of about 10,000 lineal feet of tile sewers with manholes and junctions.

Sewers to be constructed of 9 in., 12 in., and 15 in. standard vitrified sewer pipe.

Plans and specifications with bill of quantities, etc., may be seen and all information obtained at the office of the Engineer, George C. Wright, Kingston, Ont.

Tenders must be on special forms supplied by the Corporation.

An accepted cheque for Five Hundred Dollars ($500) must accompany the tender.

The lowest or any tender not necessarily accepted.

GEORGE C. WRIGHT,
Consulting Engineer,
Kingston, Ont.
W. A. GRANGE, Town Clerk,
25 Napanee, Ont.
June 11th, 1912.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Post Office Building, Gananoque, Ont.," will be received at this office until 4.00 p.m., on **Tuesday, July 2, 1912**, for the work mentioned.

Plans, specifications and form of contract can be seen and forms of tender obtained on application at the office of Mr. Thos. A. Hastings, Clerk of Works, Postal Station F., Yonge St., Toronto, Ont., at the Post Office, Gananoque, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honourable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.
Department of Public Works,
Ottawa, June 11, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—23364. 25

TOWN OF ESTEVAN
PROVINCE OF SASKATCHEWAN

Notice to Contractors

Sealed tenders will be received until 8 p.m. on **Tuesday, July 9th, 1912**, for the construction of the following works:—

Contract "A"—Water Works Force Main.
Contract "B"—Water Works Pump House.
Contract "D"—Water Pipes.
Contract "G"—Pumping Machinery.
Contract "I"—Pump Well.
Contract "O"—Outfall Sewer.
Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at Estevan, or at the Engineer's offices, on and after June 24th.

No tender necessarily accepted.

L. A. DUNCAN, Esq., Sec.-Treasurer,
Estevan, Sask.

CHIPMAN & POWER, Engineers,
Toronto and Winnipeg.
25

CITY OF WALKERVILLE

Tenders for
Pavements and Sewers

Sealed tenders will be received by registered post addressed to the undersigned, up to noon on **Monday, the 24th day of June, 1912**, for the construction of pavements and sewers in the Town of Walkerville, as follows:

Asphalt block pavement on Wyandotte street, from Kildem road to western town limit; concrete pavement—on Windermere road, from Niagara street to Huron street; concrete pavement in lane south of Wyandotte street from Victoria road to the west town line limit.

Sewer on Lincoln road (brick and vitrified block) from Erie street to south limit of Block No. 78. Crock sewer in lane between Monmouth and Argyle roads, north of Ottawa street. Vitrified crock sewer on Victoria road from Ontario to Ottawa streets, all in the Town of Walkerville.

Tenders must be accompanied by a marked cheque payable to the Town Treasurer equal to 2½ per cent. of the amount thereof.

Should any party whose tender is accepted fail to execute the necessary contract and bond for the due fulfillment of the same his deposit will be forfeited by the Town.

Plans and specifications may be seen on application to Owen McKay, C.E., Walkerville.

Deposits of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

The names of two responsible persons willing to act as securities must accompany tender.

[illegible]
Town Clerk,
Walkerville, Ont.
25

CANADIAN AGENTS WANTED

[illegible] Brick want representatives in Toronto, Montreal, Winnipeg and Vancouver. Brick is particularly suitable not only for regular street paving, but [illegible]

Situations Wanted

DRAUGHTSMAN WANTED

[illegible]

[illegible] contracting or engineering equipment. Am [illegible] Contract Record, Toronto, Ont. 25 26

Sealed tenders addressed to the undersigned and endorsed "Tender for Fittings, Finish, Etc., Armoury, Niagara Falls, Ont.," will be received at this office until 4.00 p.m., **Tuesday, June 25, 1912**, for the construction of the above works at Niagara Falls, Ont.

Plans, specification and form of contract can be seen and forms of tender obtained on application to Mr. Geo. Seales, Clerk of Works, New Armoury, Niagara Falls, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honourable the Minister of Public Works, equal to ten per cent (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, June 11, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 23632 25

Residences

(Continued from page 71)

Life Bldg. General contractor, U. J. Wilson, 201 Wentworth Block. Two and a half storeys, 33½ x 35, brick veneer. Contractor is sub-letting heating and lighting.

Residence, cost $12,000, Dorchester ave. Architect and contractors, Foster & Co., 125 Bell ave. 2½ storeys, 32 x 38, brick and stone.

Residence, cost $10,000, for P. S. Wright. General contractor, Wright & Co. 2½ storeys, brick and stone.

Apartments, cost $90,000, Furby street, for Oddson & Co., 255½ Portage avenue. Architect, D. W. Bellhouse. General contractor, Davidson Bros. Heating, Campbell & Brick Ltd., 448 Notre Dame street. Three storeys and basement, 128 x 40, brick and stone construction.

Residence, cost $10,000, for F. B. [illegible] Ross & McFarlane, Union Bank Bldg. [illegible] & McDonald. 2½ storeys, 28 x 40, cement stucco construction.

Residence, Yale ave., for H. B. Byrnes. Architect, H. E. Matthews. General contractors, Smith & Kirkpatrick, Erin and Livinia, Winnipeg. 2-sty., 34 [illegible]

Business Buildings and Industrial Plants

Bartonville, One.

Stone quarry. President [illegible] Quigley, [illegible] Hamilton. The company have purchased 100 acres of land near Bartonville and will erect quarry. Machinery required. A siding one mile long will be constructed by Toronto, Hamilton & Buffalo Railway.

Brandon, Man.

Alterations to offices and apartments, cost $5,000, Rosser ave., for Murdock Bros. Architect, W. A. Elliott. Three storeys, 30 x 90, brick. Tenders called about next week.

Calgary, Alta.

Annex to hotel, for Bell & Schissel, King George Hotel. Probable architect, J. A. McDonald, Dominion Block, Calgary. Work under consideration.

Business block, 8th ave. west, for Adams & Peers. Architect, Leo. Dowler, Calgary. Five storeys and basement, 45 x 120, reinforced concrete, brick and tile. Tenders open.

Warehouse, 50 x 130, 10th ave. east, for The Cockshutt Plow Co. Plans in preparation.

Warehouse, 100 x 130, for The Rinneley Co. Site has been secured and plans are considered.

Edmonton, Alta.

Store, cost $25,000, First ave., for The Crawford Co. Three storeys and basement, 99 x 90, brick and stone. Plans ready. Dynamos, motors and boilers required.

Halifax, N.S.

Store and office, for W. Clyde Davison, Barrington street. Architects, Harrison & Horton. Four storeys, designed to carry three additional storeys if required, concrete and steel construction. Plans in preparation.

Hamilton, Ont.

Six stores and twelve apartments, cost $20,000, Kinrade and Barton streets, for Kinrade Bros., 7 Case street. Architect, Robt. Clochey, 226 John street. Three storeys and basement, 146 x 68. Plans being prepared and buildings are to be completed Nov. 1st.

Kingston, Ont.

Remodelling bank, King and Brock streets, for Bank of Toronto, Toronto, Ont. Plans in preparation.

Lythemore, Ont.

Mill for Crown Gypsum Co., Limited, planned. one wooden tank with capacity of 1,500 gals., castings, raw steel and iron required and large quantities of lime and Portland cement. Also contemplate the erection of 25 frame houses for employees.

Niagara Falls, Ont.

Extension to factory, River road, for Spirella Corset Co. of Canada. Manager, E. R. Blew. Tenders open. Architect and engineer, Mr. Redpath, Builders' Exchange, Buffalo, N.Y. None [illegible] work.

St. Narcisse De Champlain, Que.

[illegible] ready.

Strathcona, Alta.

[illegible] for H. H. Crawford. Designer, Wm Congdon, Edmonton South. Three [illegible]

[illegible] [illegible] three new tent [illegible] [illegible] [illegible] filing machine to be installed. Excavation started.

Toronto, Ont.

Alterations to store, cost $3,000, for W. J. Robertson, 378 Yonge street. Architects, Sharpe & Brown, 18 Wellington street east. Brick.

Store and residence, cost $3,500, for M. Axler, 216 Royce ave., architect and builder. Two storeys, brick. Tenders received by owner.

Stores, apartments and halls, cost $35,000, N.E. Cor. Clinton and College Sts., for Rev. S. S. Bates, 358 Markham street. Architect, J. Hunt Stanford, Cor. Bloor and Ossington. Four storeys, 31 x 102, brick. Plans in preparation.

Welland, Ont.

Pattern store and shop, for Welland Machine & Foundries. Tenders received by architect, Wm. Edestrand. One storey, 30 x 50, hollow brick tile construction.

Canning factory, cost $20,000, Burgar street, for H. Goodwillie & Son. Architect, A. E. Nicholson, St. Catharines. Two storeys, 105 x 135, brick and concrete construction. Work being done by day labor.

CONTRACTS AWARDED

Calgary, Alta.

Stores, cost $10,000, for W. J. Moffat, Queens Hotel. General contractor, G. H. Bishop. One storey, 130 x 47, brick.

Stores and apartments, cost $15,000, Owner and general contractor, F. Kunie, 1618 2nd street n.w. Two storeys, 50 x 62-6, brick veneer.

Hamilton, Ont.

Addition, cost $20,000, for Traders Bank, King street west. Manager, A. B. Ord. Architect, A. W. Peene, 2 King street west. General contractor, Geo. F. Webb, Wentworth street. Two storeys, brick, stone, steel and concrete.

Moncton, N.B.

Variety store, cost $5,000, Main St., for R. G. Lee & Co., Fredericton, N.B. Architect, R. C. Donald, Sunny Brae, N.B. General contractor, W. R. Parker, St. George street, Moncton. Painting & glazing, W. S. Kinner & Sons, Main street, Moncton. Plumbing and heating, Sumner & Co., Moncton, N.B. Two storeys, 20 x 72, stone and cement.

Montreal, Que.

Store, cost $3,800, 370 St. James St., for B. Campbell, 2603 Waverly street. Architects, Asselin & Brosseau, 17 Place d'Armes Hill. General contractor, J. B. Johnson, 2681 Waverly street. Two stys., 35 x 20, brick veneer.

Two stores and residences, cost $10,000, Carrieres street. Owner and general contractor, Dr. A. A. Gauthier, 1313 St. Denis street. Three storeys, 48 x 70, pressed brick.

Store and dwelling, cost $3,500, St. Dominique street. Owner and general contractor, Adelard Foncault, 2229 St. Lawrence Blvd. Three storeys, 24 x 56, brick veneer.

Store, cost $8,000, 168 Shannon street, for Owen C. Dawson, 209 Champ de Mars street. General contractors, Byers & Anglin, 65 Victoria street. Two storeys, 40 x 50, brick and stone.

Bakery, cost $8,300, Clark street, for Medard Paquette, Boulevard St. Joseph. Architect, Zotique Trudel, 238 St. Andre street. General contractor, T. Lessard, 210 Park ave. Two storeys, 42 x 44, brick and stone.

Stable and shed, cost $50,000, Burke and City Councillor streets. General contractors, H. Morgan & Co., St. Catherine street west. Architect, Ralph Berrill, 15 Beaver Hall Hill. Three stys., 147 x 114, brick construction.

Store and residence, cost $5,000, for Emerie Sauve, general contractor, 265 Monk Blvd. Two storeys, 40 x 60, brick veneer. Excavation started.

Ottawa, Ont.

Shop and residence, cost $3,000, Preston street. Owner and general contractor, Frank Guzzo, 77 George street. 33 x 46, double brick veneer construction.

Port Robinson, Ont.

Canning factory, cost $35,000, four buildings, for British Canadian Canners. Architects, Munro & Meade, Chancery Chambers, Hamilton. General contractors, Marcus Vanderburg, Welland. Carpenter, J. E. Cutler, Welland. Two and one storeys, 30 x 100, 48 x 128, 110 x 60, 33 x 110. Brick and concrete.

Saskatoon, Sask.

Garage, cost $6,000, 2nd ave., for Mr. Blackstock. General contractors, Shannon Bros. & Cassidy. 1-sty. and basement, 40 x 135, brick.

Toronto, Ont.

1 pair stores and residences to cost $10,000, cor. Fiskin avenue and Dundas street. Architect and builder, Mr. Burman, 1986 Dundas street. Brick.

Warehouse to cost $26,000, 116-18 Richmond street west, for C. S. Boone, 17½ Adelaide E. Architect, Chadwick & Beckett, 18 Toronto street. Mason, Elgin & Page, 21 Havelock street. Carpenter, J. E. Almond, 78 Constance st. Roofing, Walter Davis & Co., 172 MacPherson ave. Heating, Jos. Harrison, 557 Palmerston ave. Steel sash, Steel & Radiation, Ltd., Fraser ave. Cement, stone, Toronto Ornamental Stone Co. 4-sty. and basement. brick.

Bank building, Queen and Logan ave., for Bank of Toronto. Architects and Builders, Chapman & McGiffin, 59 Yonge street. Mason, Self Bros., 78 Howard street. Carpenter, Wm. Monro & Sons, 76 Spadina ave. Roofing, Geo. Mathewson, 734 Queen street east. Plumbing and gas, Purdy, Mansell, 63 Albert street. Electric wiring, Keith & Fitzsimmons, 111 King street west. Plastering, W. H. Little, 33 Henry street. Paint and glass, H. W. Johnston, 209 Church street.

Vancouver, B.C.

Store and office building, to cost $29,000, 633 Granville street, for Ackroyd & Gall. Architect, S. B. Bird, Duncan Bldg. General contractor, C. L. Williams, 319 Pender street. Four stys., 25 x 120, brick mill construction.

Stores and rooms to cost $30,000, for Chinese Syndicate, Alexander street. Architect, Stuart, White & Peters, Metropolitan Bldg. General contractors, Wood & McDonald. 3-sty., 550 x 120, brich construction.

Vulcan, Alta.

General store, cost $4,000, for Elves Bros. General contractor, W. Jennyjohn. Two storeys, 30 x 50,

Winnipeg, Man.

Warehouse, cost $13,000, James street, for Richards & Brown. General contractors, Wallace & Aikins, 283 Donald street. Architect, G. W. Northwood. Brick and concrete.

Office and theatre, Smith and Portage, for A. R. McNichol, 219 McDermott ave. Architect, J. N. Semmens, 903 McArthur Bldg. General contractors, Kelly Construction Co., 219 Phoenix Blk. 3-sty. addition, 125 x 40, brick.

Welland, Ont.

Factory for Canadian Steel Foundries, General contractors, Hamilton Bridge Co., Hamilton. Steel and brick construction.

Yarmouth, N.S.

Bank, cost $25,000, for Royal Bank of Canada, Montreal. Architect, Kenneth J. Rea, 54 Beaver Hall Hill, Montreal. General contractors, James Reid. Mason contractor, Frazer Gavil, both of Yarmouth, N.S. Two storeys, terra cotta and concrete.

Power Plants, Electricity and Telephones

Calgary, Alta.

Electric appartus. One 500 kw. synchronous motor generator, delivered and installed in city. Specifications at Commissioner's office. Tenders received by City Clerk, J. M. Miller, until noon, June 26th.

Montreal, Que.

Electrification of railway, St. Lambert to St. Cesaire, for Montreal & Southern Counties Ry. Co., 606 Canadian Express Bldg., Montreal. Contract for generators, etc., awarded to Canadian Westinghouse Co. and contract for switch-boards and overhead construction will be let shortly.

St. Johns, Que.

Electrical work. The Dorchester Electrical Co., Quebec, Que., were awarded the contract for street lighting. The Canadian General Electric Company, Montreal, the contract for dynamos. The Bobcock & Wilcox Co.'y, Montreal, contract for boilers.

Sorel, Que.

The town council is contemplating the purchase of two new electric motors and three pistons for the waterworks.

Stratford, Ont.

Contract for electric wiring additions to Windsor Hotel has been awarded to F. C. Whatmough, electrical contractor of stratford.

Winnipeg, Man.

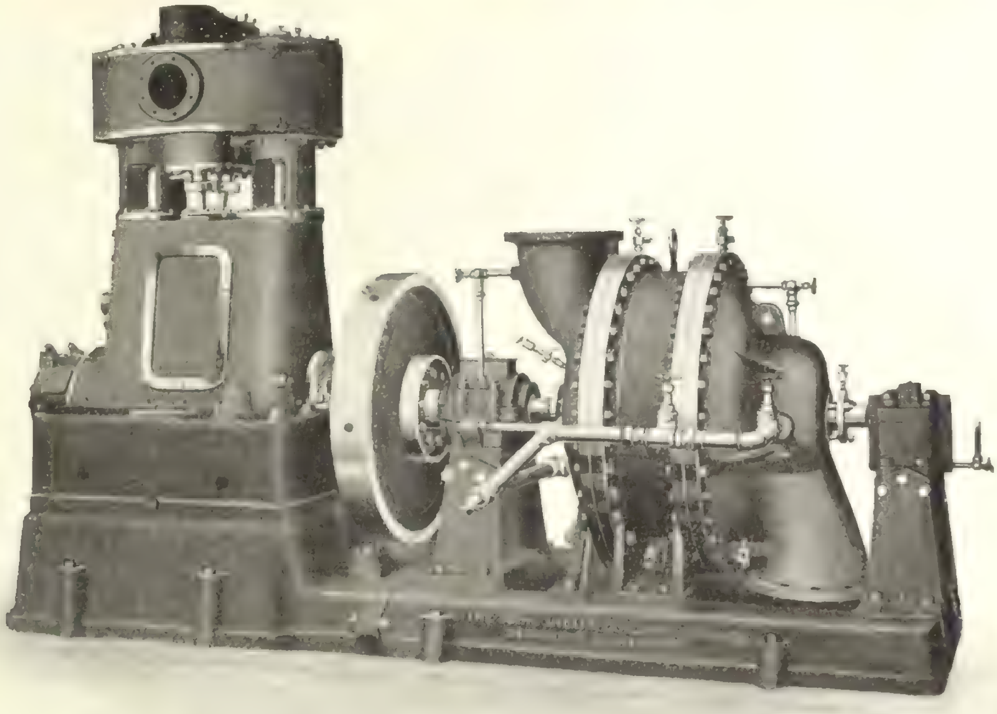
Ornamental lighting standards. Engineer, J. G. Glassco, 54 King street. The Western Supply & Mfg. Co., 301 Donald Bldg., received contract for 70 Ornamental street lighting standards at $1.25 each, f.o.b., Winnipeg.

Transformers for power station. Tenders received by Board of Control until June 28th for three 1000 kw. transformers for terminal station in place of 500 kw. at present time. Plans at office of engineer, J. G. Glassco, 54 King street.

Power transmission line, cost $10,075. Engineer, J. G. Glassco, 54 King street. General contractor, Canada Sales Company, Donalda Block, Winnipeg.

STEAM DRIVEN TURBINE PUMP

which we made and installed for the City of Edmonton, Alta.



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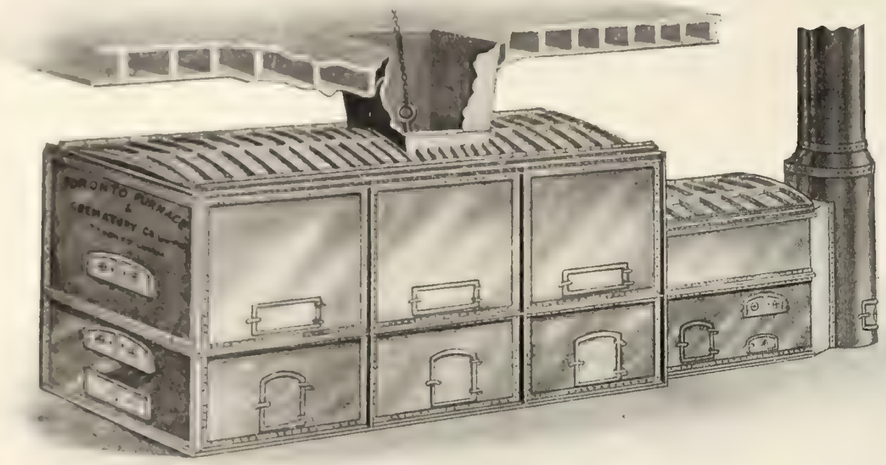
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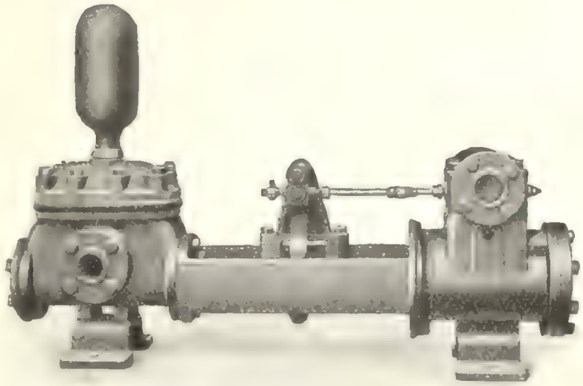

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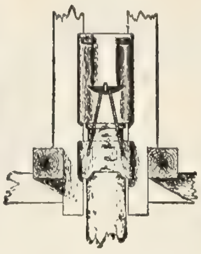
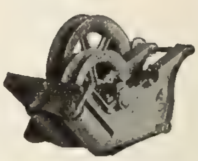
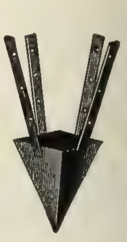
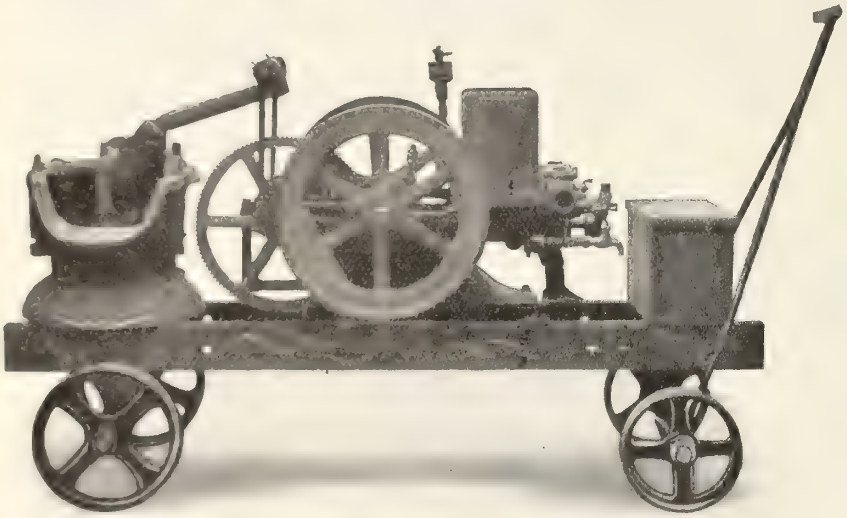


Casgrain Pile Cap



Perfect Head Block





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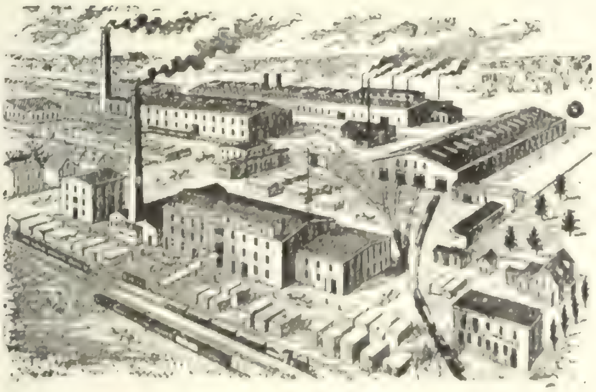

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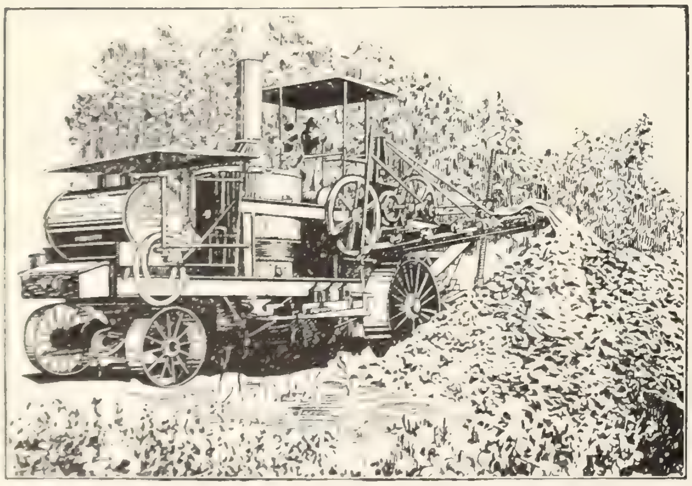

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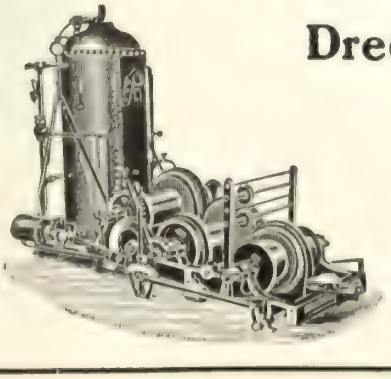

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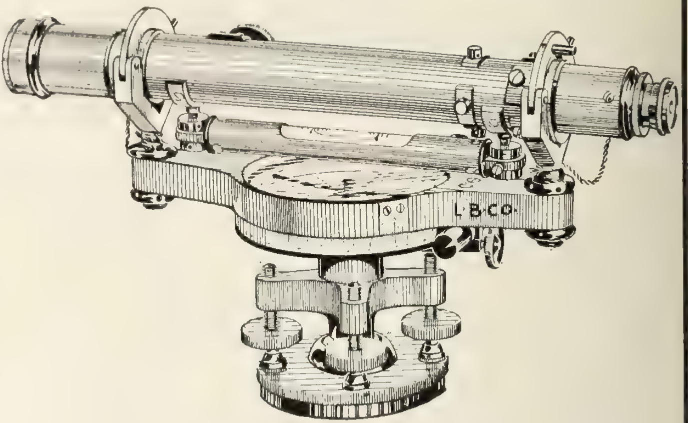

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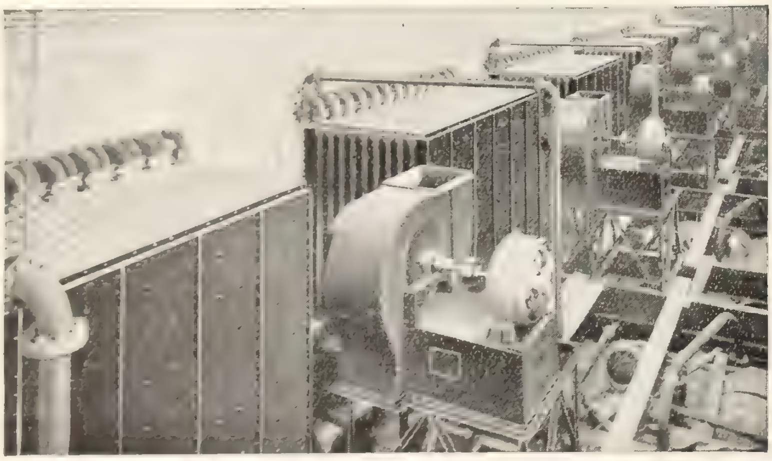

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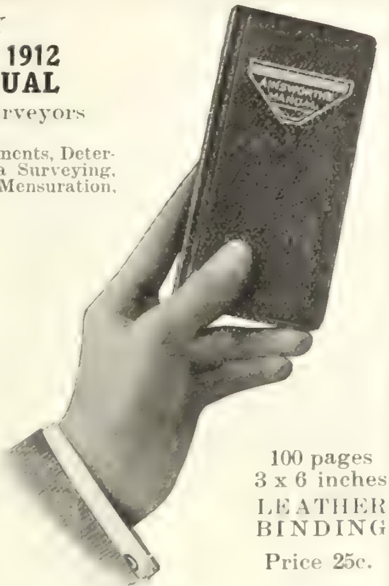

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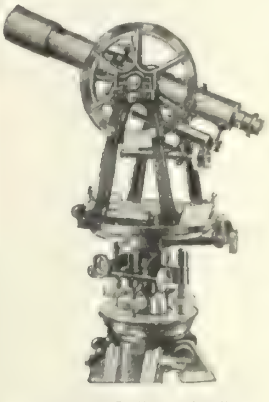

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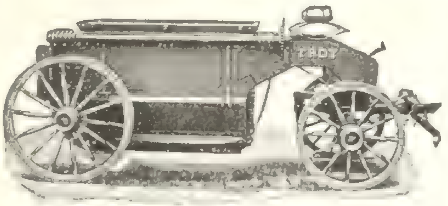

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It's a safe rule to judge goods by the men who handle them. Here's the company we keep. These firms are Canadian distributors for the TROY line. They carry complete stocks on hand all the time. When you want anything in the way of Dump Wagons, Traction Hauled Wagons or Dump Boxes, just see our agents or write us for Catalogue 2 Z.

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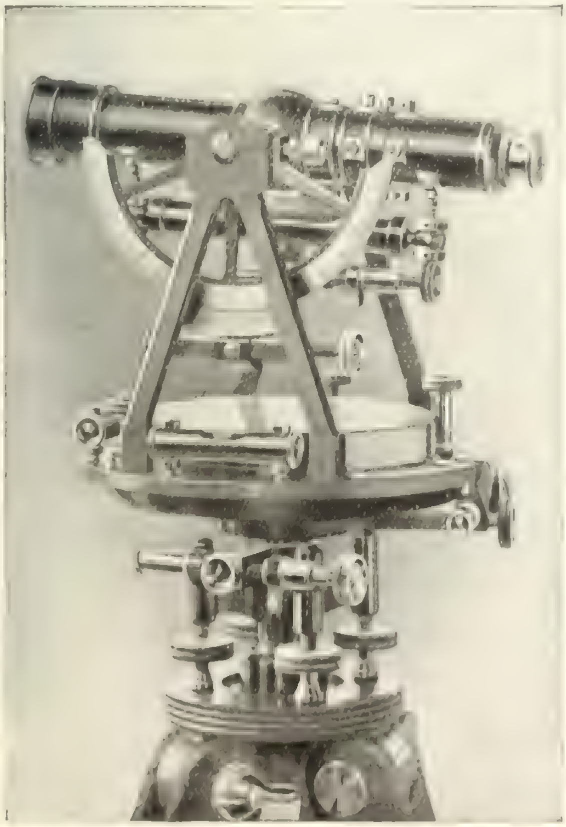

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between using "dump boards" and buying expensive dump wagons for your roadwork, is the

EVERETT Portable DUMPING BOX

Will save considerable time and labor over "dump boards" and costs only one third the price of a dump wagon.

Dumps instantly or spreads the load. Fits any ordinary wagon gear. Simple, convenient and efficient. Strong and durable, will last the life of any dump wagon made. Send for catalog.

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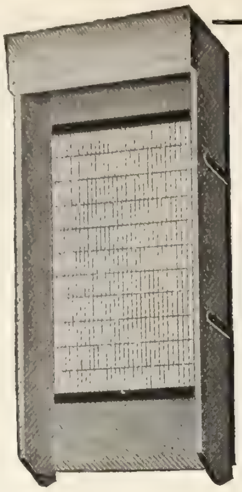

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We make **SCREENS** for all purposes

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Shall be pleased to quote you.

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Artistic Coloring and Thorough Waterproofing in One Operation

They give the same soft, artistic coloring effects as the celebrated Cabot's Shingle stains and at the same time make all exterior cement surfaces ***completely*** and ***permanently*** rainproof. They sink into the pores and form no coating over the surface, and therefore do not cover and spoil the natural texture of the cement and cannot crack or peel off. Low cost, easy to apply, and the only artistic colorings for cement.

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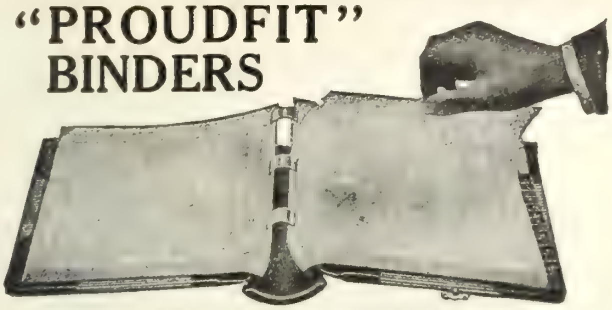

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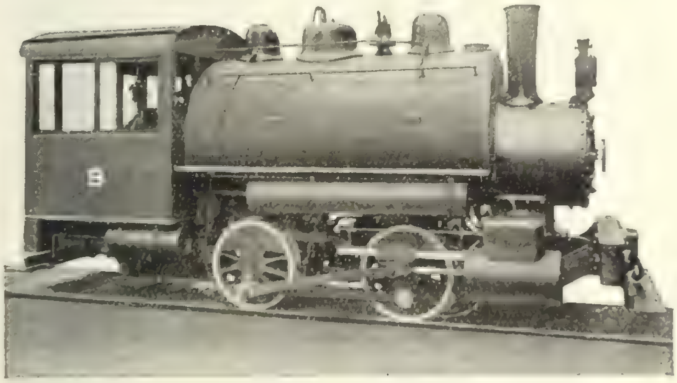

Our locomotives are not built for one job only. They are built to last for years in the hardest service with a minimum expense for upkeep. This is the only proper way to build them.

Facility for making repairs when parts wear out was carefully considered in the design of our standard locomotives. Every detail is made with a view of securing the greatest possible reduction in the expense of repairs. Interchangeability reduces the time the locomotive is idle when repairs are necessary, as like parts will fit any other locomotive of the same size and design.

Consider the reduction in your profits when your locomotives are waiting for repairs.

Interchangeable parts, sure to fit, are kept in stock at all times and can be shipped at short notice.

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Dominion Express Building, MONTREAL, Canada

Cumberland County Quarries
Red and Grey Freestone
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Hardens with Age. Low Price. Samples and Quotations Free

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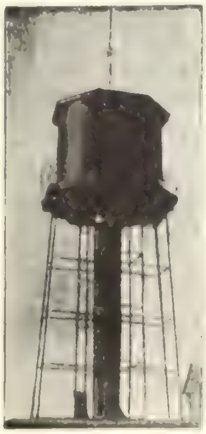

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Suitable for Sprinkler Systems Fire Protection, Water Supply Plants, etc.

Steel Substructures of all kinds
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Windmills, Gasoline Engines, Hydraulic Rams, Etc.

Ontario Wind Engine & Pump Co.
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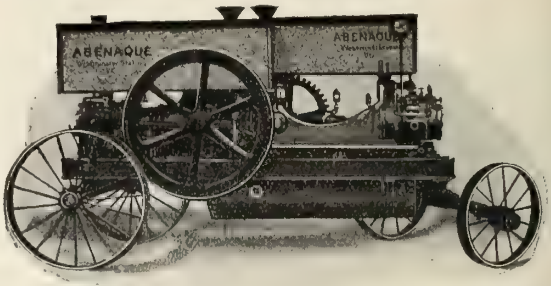

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If you have any rock excavation for foundations, trench work, or any riveting, caulking, etc. to do you will find an Abenaque Outfit can be used with ultimate economy, and to better advantage than either hand or steam driven tools. Write for catalog "M."

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Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

Samples may be seen at District Sales Offices:—

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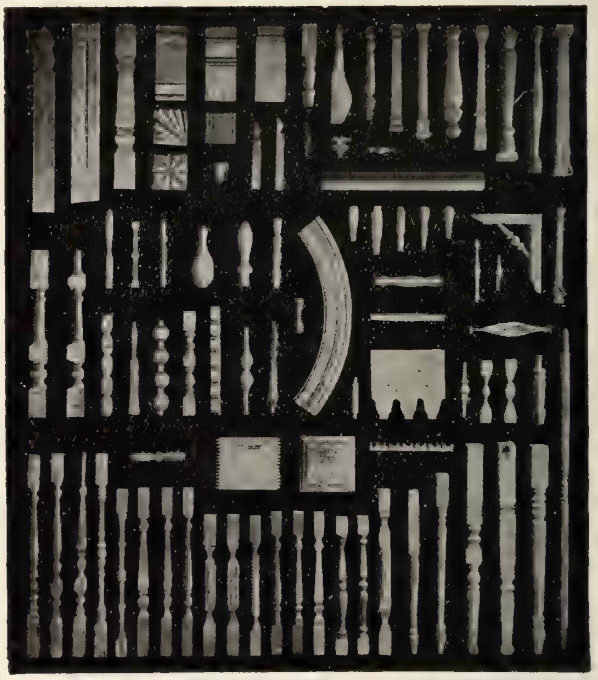

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Enamelled Woodenware, Dowels, Mailing Boxes, Pill Boxes, Pail Handles, Broom Handles, Paper Plugs, Knobs, and Turnings of all kinds

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AMERICAN ENAMELED BRICK & TILE CO.
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Take the Best Care of Your Horses, it will Pay You

Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

The lines that are selling best are:

Johnson's Horse Liniment, No. 1 (Alcoholic)

1 gal. jugs (Imperial)	$4.50 gal
1 lb. bottles	8.00 doz.
2 lb. bottles	15.00

Positively the best all round Horse Liniment made.

Johnson's Horse Liniment, No. 2 (an oil liniment)

1 gal. jugs (Imperial)	3.00 gal.
1 lb. bottles	6.00 doz.
2 lb. bottles	11.00 doz.

Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal. jugs (Imperial) 40 doses	5.00 gal.
1 lb. bottles 4 doses	8.00 doz.
2 lb. bottles 8 doses	15.00 doz.

Johnson's Veterinary Healing Ointment (Gall Cure)

2 lb. tins	2.00 per tin
4 oz. tins	3.50 doz.

Johnson's Condition Powders (Concentrated)

1 lb. packages	3.60 doz.

A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men

Johnson's Mosquito Oil 1.75 doz., 18.00 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

A. H. Johnson, Wholesale Druggist, **Collingwood, Ont.**

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Locomotive Cranes on Construction Work

The one shown here is working on the New York State Barge Canal equipped with a scraper bucket. These cranes are used from the beginning to the end of a construction job. They do the excavating with any style bucket; drive the piling; deposit all concrete both to elevated forms and to trenches; handle the sand, gravel, crushed stone, heavy timbers and steel sections; and switch the cars.

These different operations are shown in our new illustrated catalog. Write for it to day. It is free.

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and all Colors, Glazed and Unglazed

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Coal Mining and Coal Handling Machinery, Rotary Tipples, Steel Picking, Sorting and Loading Belts, Perforated and Bar Screens, Vibrating Screw and Disc-conveyors, Steel Mine Cars, Rope Pulleys, Car Hauls, Trip Feeders, etc.

Elevating and Conveying Machinery for Coal and Ore, (Robins Patents).

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The James Ore Concentrator Company, Newark, N. J.

Correspondence Solicited.

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A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

Get a copy of this booklet. The information contained therein is both interesting and valuable. It is a concise story of The Dahlstrom Products and What They Are. Free for the asking.

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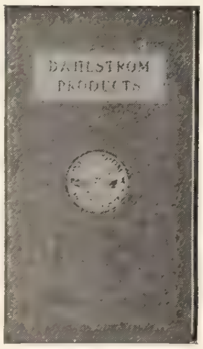
Executive Offices and Factories: 17 Blackstone Ave., JAMESTOWN, NEW YORK.
Branch Offices in All Principal Cities.



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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per B
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 and 30 per cent. for approved specifications:—

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.05	$4.40
40	3.25	4.75
50	3.65	5.55
60	3.90	6.00
70	4.15	6.50
80	4.65	7.00
85	5.10	7.85
90		9.10
95		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85 .. .		10.00
86/90 . .		11.00
91/95 . .		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 and 5 per cent.
High grade compression work, 56 and 5 per cent.
Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 basin cocks, 70 per cent.
Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 and 5 per cent.
No. 4 compression bath cock .... net $1.85
No. 4½ Fuller's .... net $2.35
Square head brass cocks, 60 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe

Lead pipe, 20 per cent. off; lead waste, 20 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)		Black.			Galvanized
¼ inch	....	$1.87	¼ inch	....	$2.70
⅜ "	....	1.87	⅜ "	2.70	2.57
½ "	2.47	2.35	½ "	3.40	3.23
¾ "	2.88	2.75	¾ "	4.03	3.83
1 "	4.13	3.93	1 "	5.78	5.48
1¼ "	5.63	5.35	1¼ "	7.88	7.49
1½ "	6.75	6.44	1½ "	9.45	8.98
2 "	8.46	8.05	2 "	12.06	11.46
2½ "	13.51	12.85	2½ "	19.26	18.30
3 "	17.74	16.86	3 "	25.29	24.03

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.
Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.
Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.45.
Binder stone, $1.30 per ton, f.o.b. Toronto.
Burnt River rubble stone delivered, $15 to $16 per toise.
Free stone delivered, $15 to $16 per toise.
Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.
Brown sills and leads, in the rough, delivered, 40 cents per foot.
Rubble Stone in car lots, $1.30 per ton.
Scotch fire brick, delivered, $30 to $35 per M.
Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.
Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.
Lime, per cwt., delivered, not less than 1,500 lbs., 38 cents.
Plaster of Paris, per barrel, delivered, $3.10.
Manilla Rope, best, per pound, 16½ cents.

PAINTS AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $7.25 per 100 lbs.
Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.
Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.
Boiled Linseed Oil, in barrels, $1.01 per gallon of 9 lbs.
Raw Linseed Oil, in barrels, 98c. per gallon of 9 lbs.
Turpentine, in barrels, 70c. per gallon.
Pure Red Lead, dry, $6 to $7 per 100 lbs

New Companies

The Hamilton Suburban Land Company, Limited, has been incorporated with a capital of $100,000 to carry on a general land and building business with head office at Toronto. The provisional directors are J. F. Selby, W. A. Sargant and W. J. McDonald, all of Toronto.

The Oakwood Realty Company, Limited, has been incorporated with a capital of $40,000 to carry on business as a general land and building company with head office at Hamilton. The provisional directors are W. W. Currier, Jno. Poag and H. R. Mason, all of Hamilton.

Viewmount Land Company, Limited, has been incorporated with a capital of $1,000,000 to carry on a general land and building business, with head office at Montreal. The incorporators are Robt. Taschereau, J. E. Billette and C. E. Lamb, all of Montreal

Dominion Equipment and Supply Co. has been incorporated with a capital of $100,000, to manufacture and deal in all kinds of timber, lumber and builders' supplies with head office at Vancouver, B. C. F. E. Cantwell is the attorney.

The Jarvis Electric Company, Limited, has been incorporated with a capital of $20,000 to carry on business as electrical and general contractors, etc., with head office at Vancouver.

Canadian Marble Company, Limited, has been incorporated with a capital of $100,000, to manufacture and deal in artificial stone for building, paving and other purposes with head office at Toronto. The provisional directors are C. M. Garvey, W. H. Price and E. Braden, all of Toronto.

The White Syndicate, Limited, has been incorporated with a capital of $110,000, to carry on business as a general land and building company, with head office at Toronto. The provisional directors are W. G. Weichel, L. W. Shuh, and F. Doering, all of Waterloo.

Honsberger & Company, Ltd., has been incorporated with a capital of $50,000, to carry on business as a land and building company, with head office at Toronto. The provisional directors are C. J. McLaughlin and W. J. McCallum, both of Toronto.

The Canada Brick and Fireproofing Company, Limited, has been incorporated with a capital of $500,000, to manufacture and deal in bricks, tiles, drains and sewer pipes, etc., with head office at Toronto. The provisionad directors are K. McWhinney, Herbert Stinson and T. F. McCraken, all of Toronto.

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of all designs in both iron and steel; Roofs, Telephone Poles, House Girders and all kinds of Structural Iron Work.

Our stock in hand comprises Steel Beams, Angles, Tees, Channels, Plates, Rolled Edged Flats, Bars, Rivets, Rounds, &c.; Iron Beams, Bars, Squares Turnbuckles, Rivets, &c.

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Locomotive Turn Tables and Structural Steel and Iron Work of all descriptions. Estimates furnished on application.

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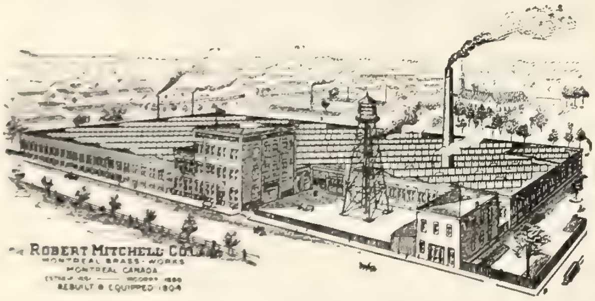

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Structural Steel for Quick Delivery

We carry in stock at Montreal, 5,000 tons of Structural Shapes and are in a position to make quick shipment of either plain or riveted material for

Bridges, Roof Trusses, Columns, Girders, Beams, Towers and Tanks, Penstock

Estimates Furnished Promptly.
Capacity 18,000 Tons Annually

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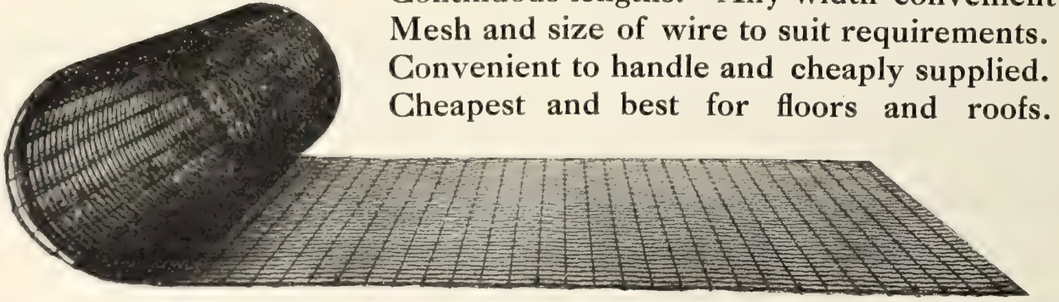

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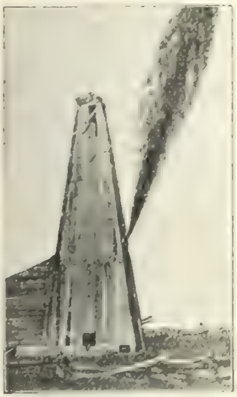
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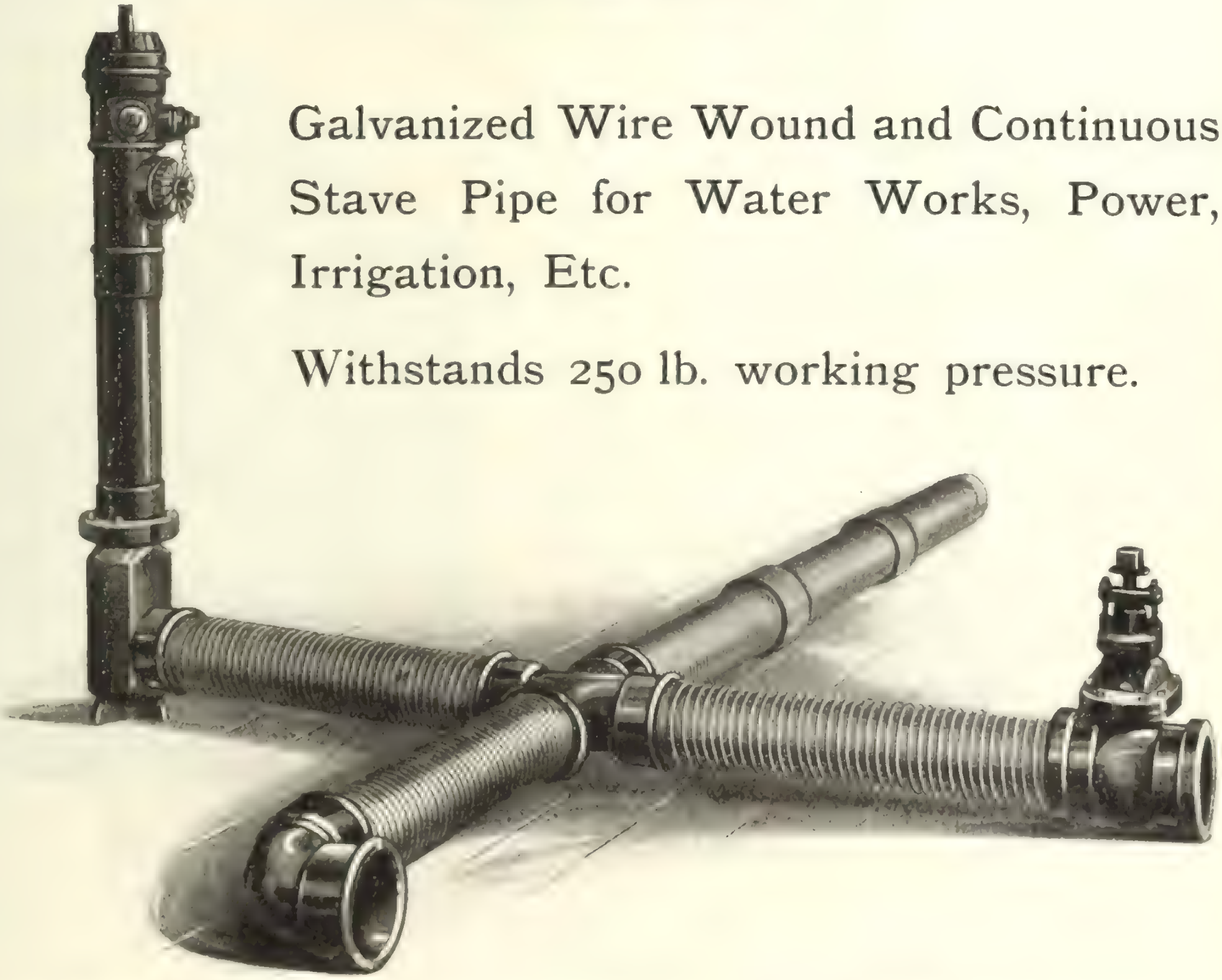

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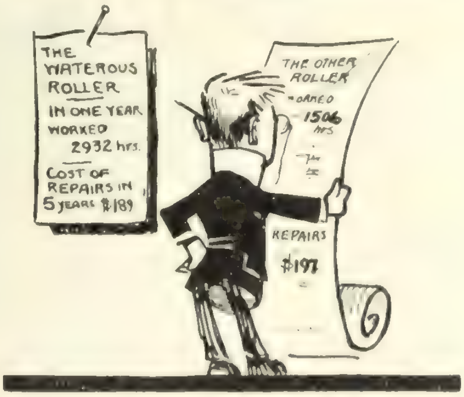

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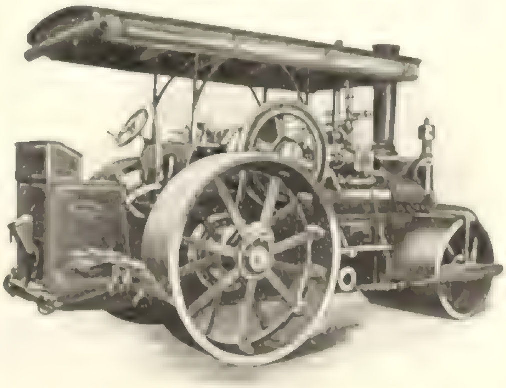

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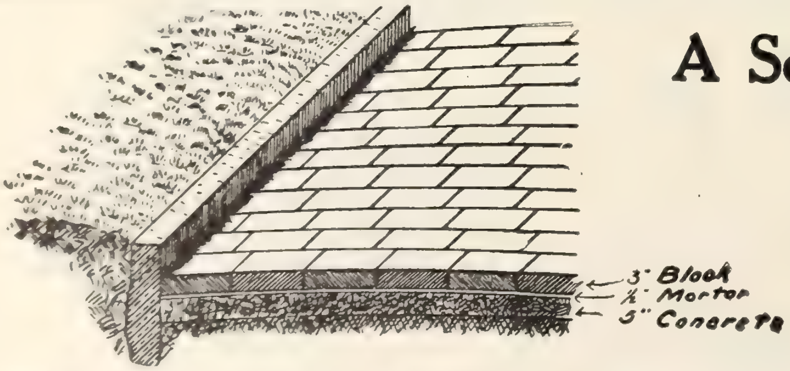

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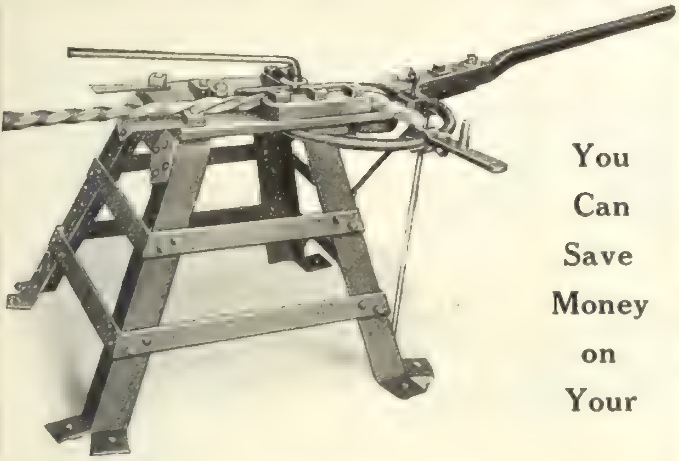

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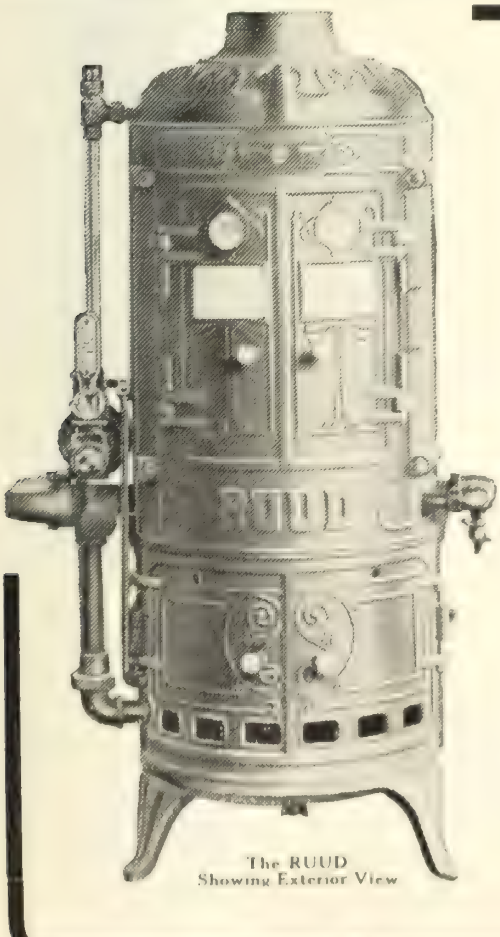

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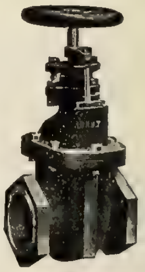

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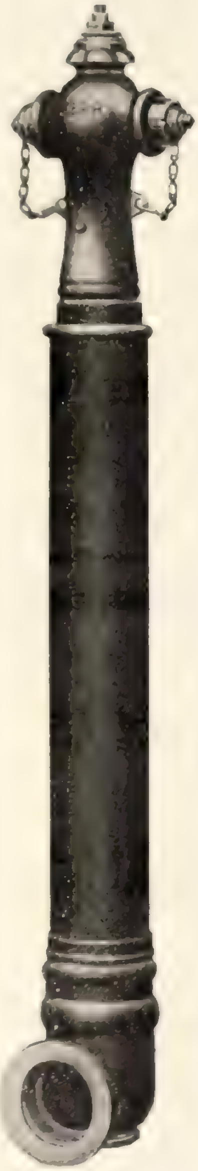

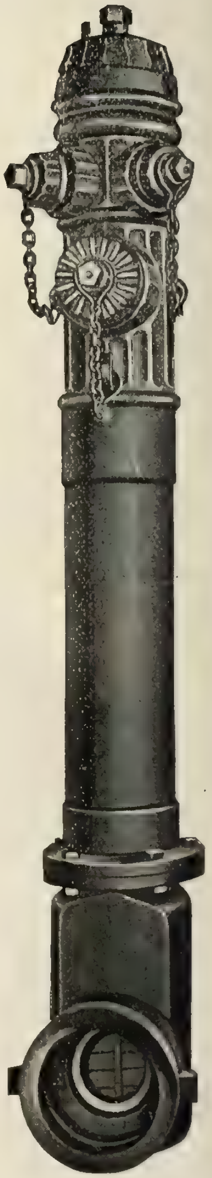

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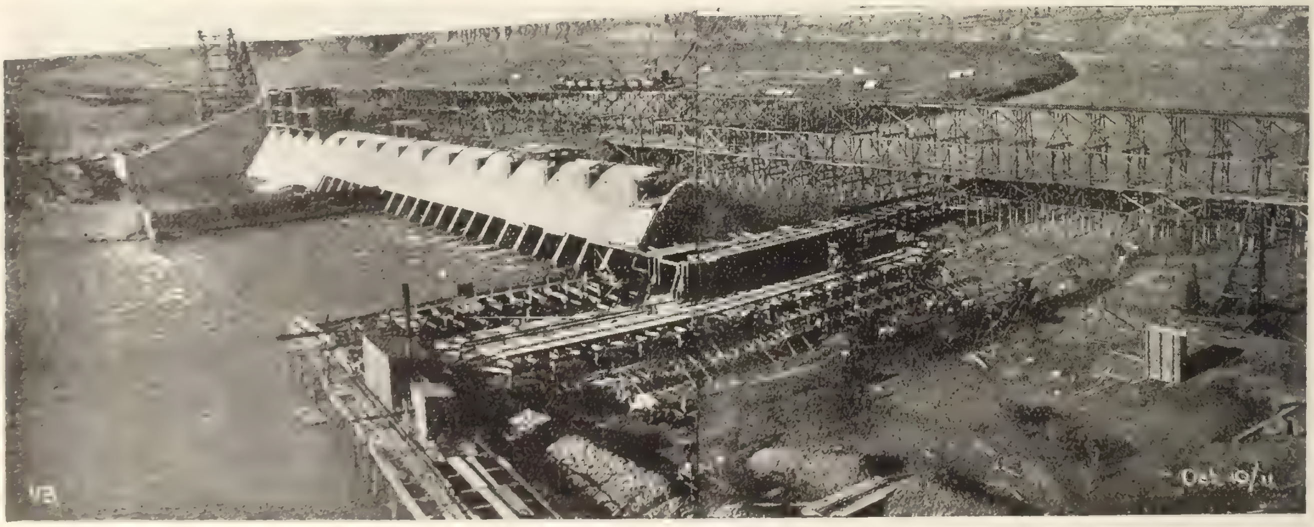

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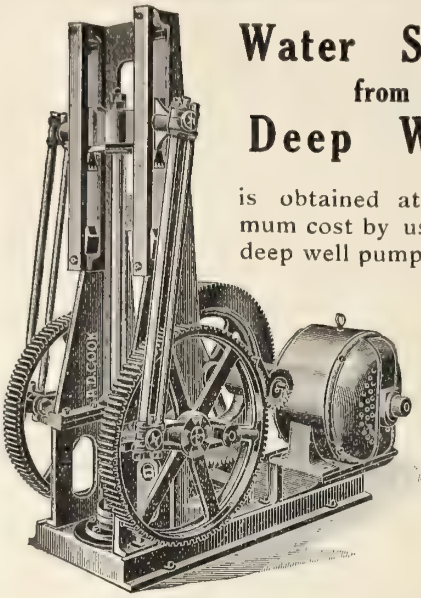

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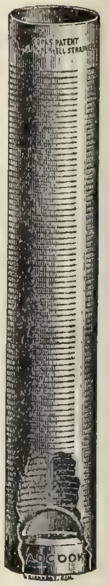

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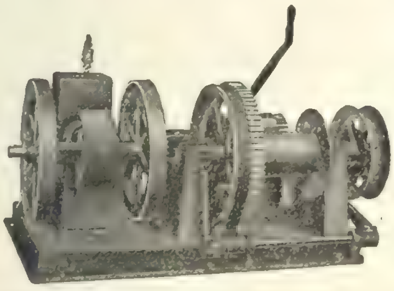

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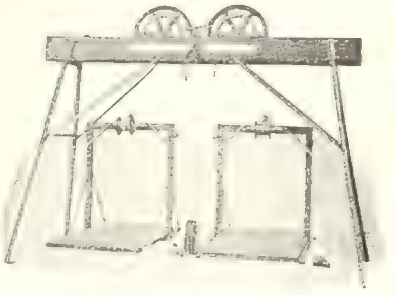

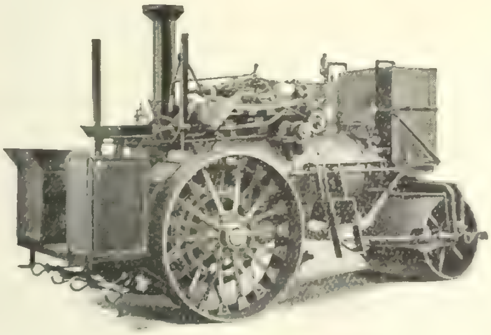

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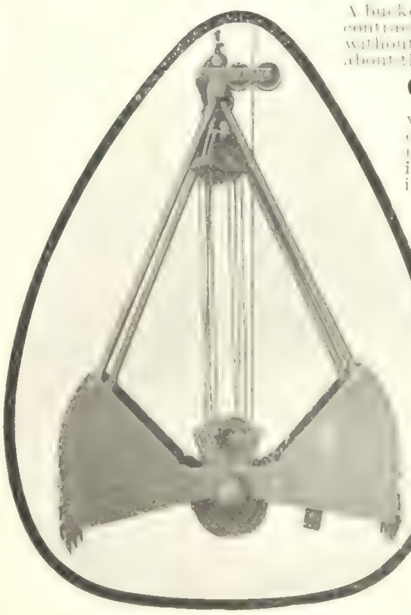

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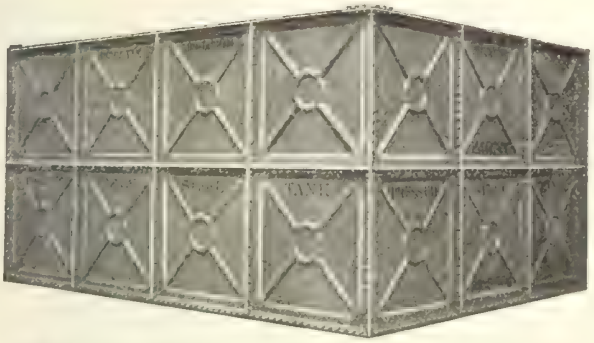

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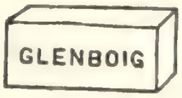

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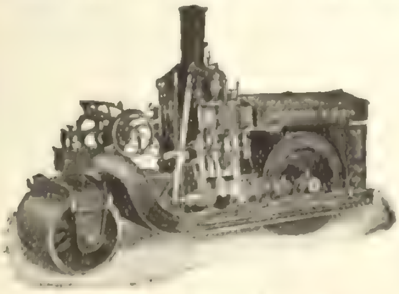

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No. 2 is Charcoal Iron
No. 3 is Steel

During the test the "Toncan" metal showed a loss of 2½ per cent; the charcoal iron showed a loss of 11 per cent and the steel showed a loss of [illegible] per cent.

For Heavy Railroad Construction

The riveted type of Pedlar Perfect Culvert is made in "Toncan" metal which is 99.94% pure iron product. This means that in the process of manufacture, phosphorus, manganese, silican, sulphur and carbon—all the corrosive elements contained in ordinary iron and steel—are eliminated. Moreover, after all the precautions have been taken to make "Toncan" metal non-corrosive, the sheets are coated with a heavy film or coating of spelter.

It is by the use of this metal that we are able to assure the lasting qualities of

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Pedlar Riveted Culvert has lateral, narrow and deep corrugations of greater frequency than in any other length of culvert on the market. It is made to specifications for length, in sizes of an internal diameter from twelve to eighty-four inches. The lengths are in multiples of about twenty seven inches assembled.

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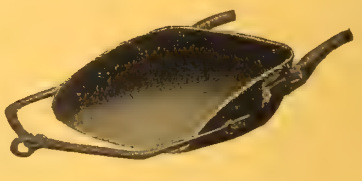

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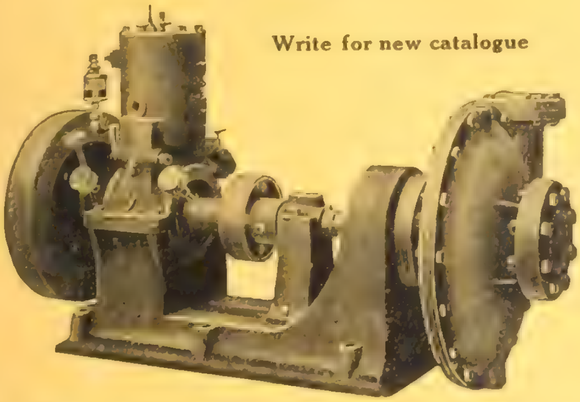

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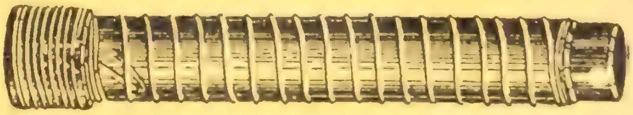

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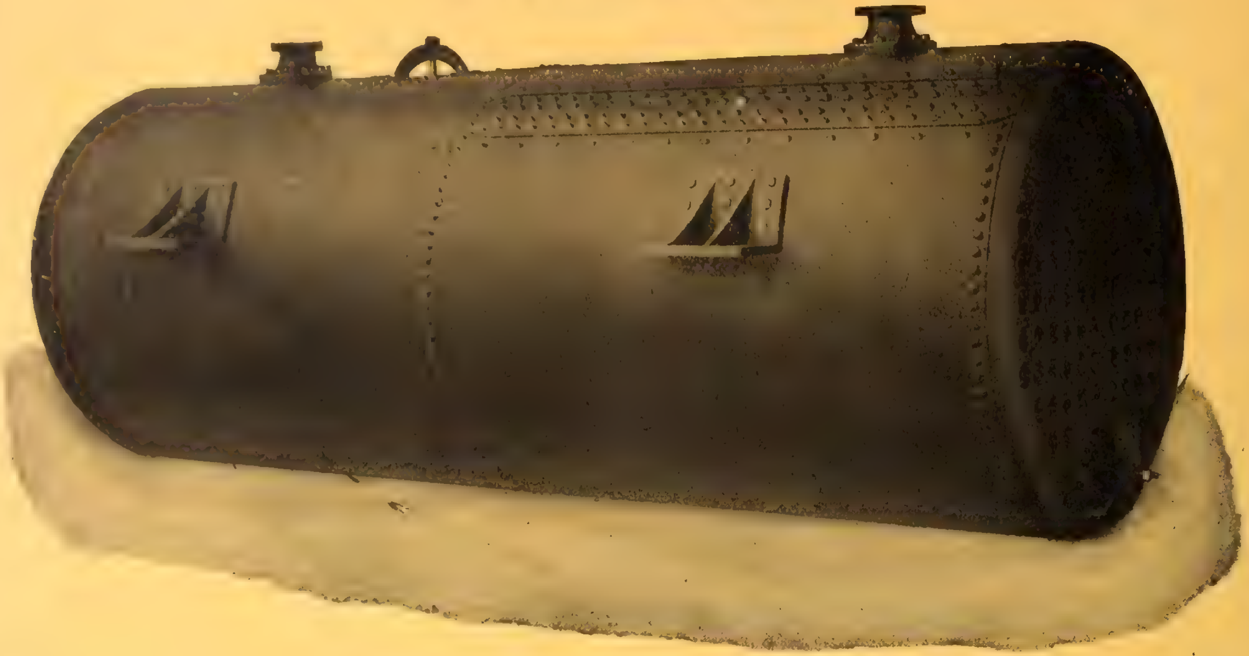

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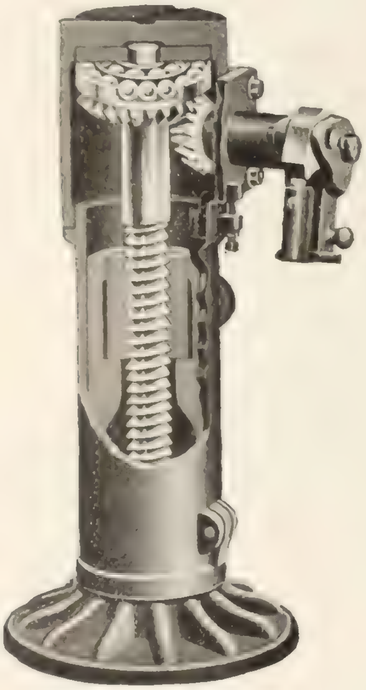

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The steadily increasing demand for DON VALLEY products has necessitated the large addition now under way.

The makers of DON VALLEY brick and porous terracotta fire proofing started out with one idea—to make the most perfect building material on the American Continent.

The consummation of that idea was only brought about by the continuous maintenance of a high efficiency plant and painstaking care to the minutest details of manufacture.

If you want to be sure always specify DON VALLEY products.

Don Valley Facing Bricks in Every Practical Shade and Color

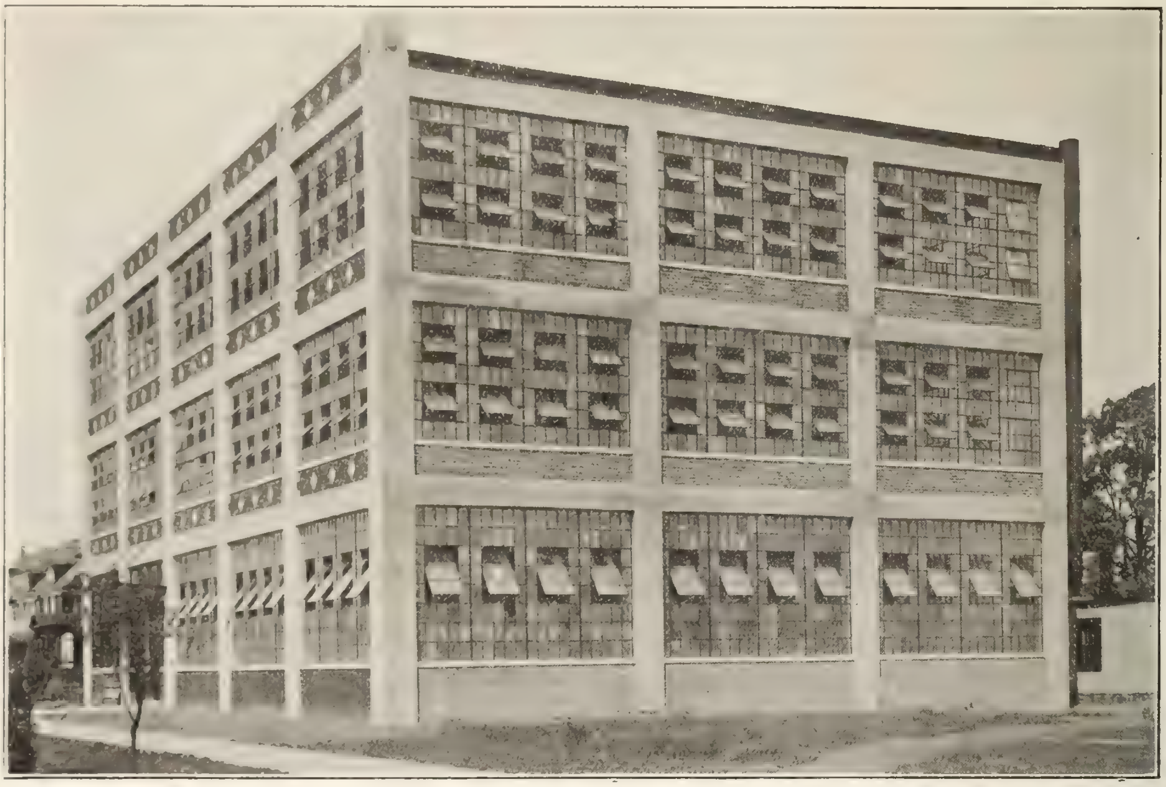
Don Valley Enamelled Bricks

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO
Montreal Agent: **David McGill, 83 Bleury Street**

Increase Your Production
Reduce Your Costs

Light - Ventilation - Low Upkeep



One of the many buildings in Canada equipped throughout with **"Fenestra"** Solid Steel Windows.

Is first cost in your Window Sash everything?

How about second, third,—tenth costs?

Future Upkeep—that's the point!

See to it that your architect gives you clear, positive facts and figures on sash upkeep.

Remember we're right here to give you, or your architect, all the facts about **"Fenestra"** Solid Steel Windows and Ventilators.

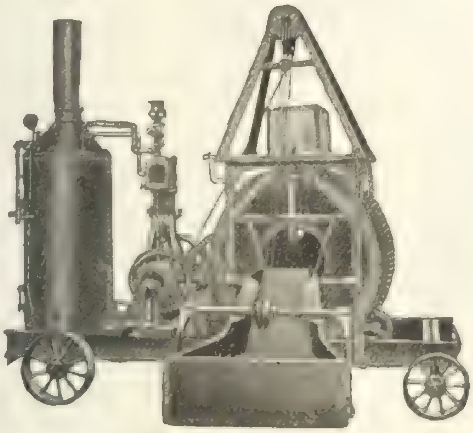
Consult us before settling the all-important question of window requirements. Then you can make your comparison of all types of windows intelligently and completely.

"FENESTRA" Solid Steel Windows

For Factories, Foundries, Power Houses, Garages, Prisons, Asylums, etc.

STEEL and RADIATION, Limited
Toronto, Canada

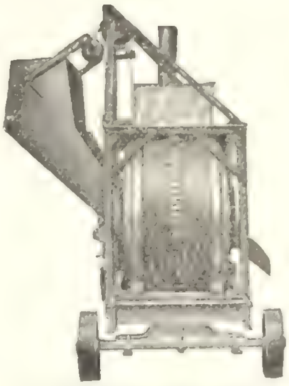
Concrete Mixers



Standard Drum Batch Mixer

SEVERAL KINDS and built in sizes to suit all classes of work.

The Many Improved features of the London Mixers have placed them in a CLASS BY THEMSELVES.



Standard Drum Batch Mixer

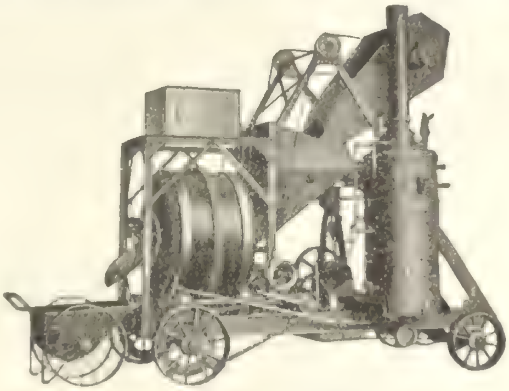
We can save the contractors money. Every machine made in our own factory.

On FIRST COST.

On COST OF MAINTENANCE.

On COST OF OPERATION.

SEND FOR OUR CATALOGUE



Rear Discharge Paving Machine with Forward Loader

Our machines are not made down to a price, but MADE UP TO A STANDARD.

By Manufacturing IN A LARGE SCALE we have been able to offer High Grade Machines AT REMARKABLY LOW PRICES.

Paving Machine with Side Loader

We manufacture a full line of Concrete Machinery and Cement Working Tools. Also a full line of Hoisting Engines and Contractors Equipment.

We are the Largest Manufacturers of Concrete Machinery in Canada.

No. 2 Automatic Batch Mixer

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

Toronto Office: N.E. Cor. Richmond & Bay Sts.
Winnipeg Office: 445 Main St. Winnipeg, Man.

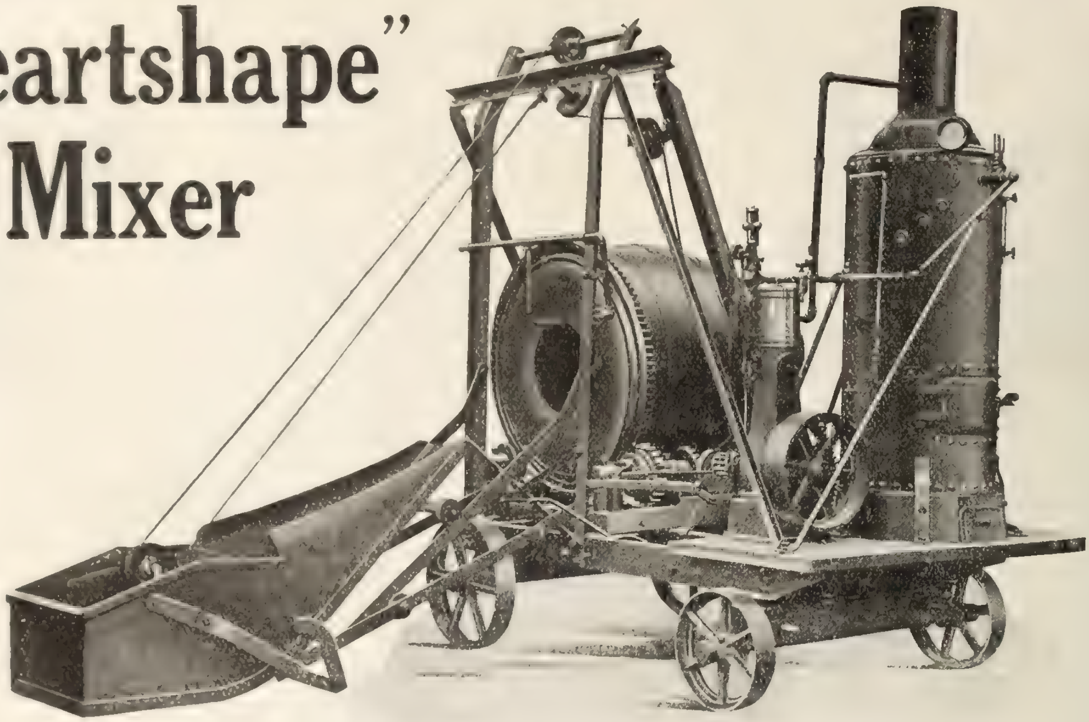
AGENTS:

The Foss & Hill Machinery Co., Montreal, Que.
Hamilton Machinery Co., Calgary, Alta.
G. B. Oland, Halifax, N. S.
B. C. Equipment Co., Vancouver, B. C.

We are the Largest Manufacturers of Concrete Machinery in Canada

NOT CHEAPER
BUT BETTER

Wettlaufer Improved "Heartshape" Mixer



THE ultimate quality of all concrete work depends directly on the work done by *your mixer*—to do good concrete work, use a good mixer. With the Wettlaufer "Heartshape" Mixer you are positively ensured proper mixing —this is the reason

The "Heartshape" Drum

at every revolution turns the batch end for end—how could you get a positive mix otherwise? Then the "Heartshape" drum empties ***positively clean*** at every dump —there is no chance of clogging or corroding—no solid concrete to hammer and chip out afterwards. Every part of the mixer makes for smooth movement and long life. Every action makes for good mixing and steady work.

The automatic hopper gives a quick charge. The "Heartshape" drum gives a quick mix and a quick dump—the whole operation is controlled by one man from one point on the machine.

Contractors you should do all your concrete work with a ***Wettlaufer Improved "Heartshape" Mixer***—it will save you time, labor and money. Come and see the mixer working—we will prove what we say.

WETTLAUFER BROS.

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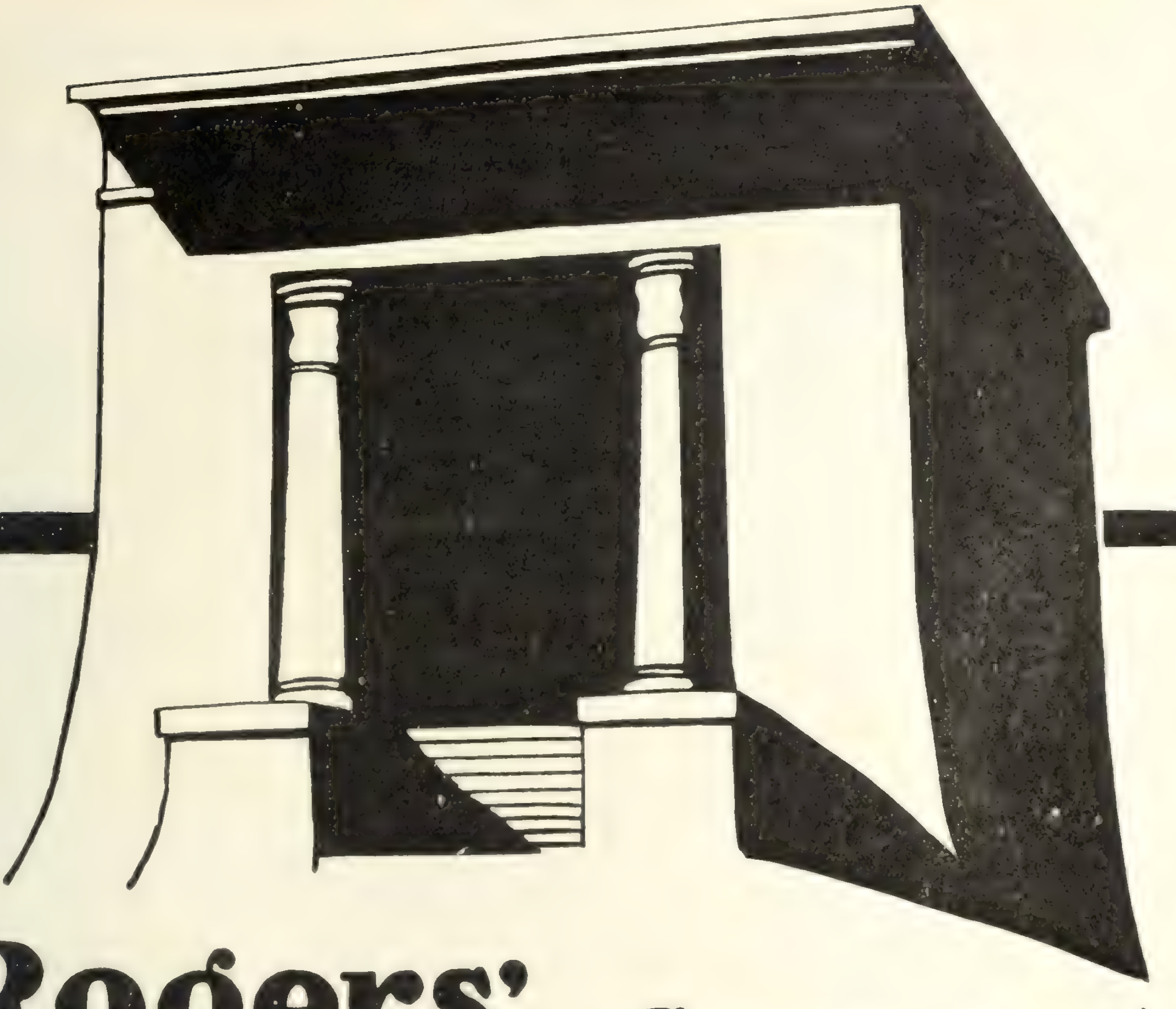
Hooton & Moore
613 Ashdown Block,
Winnipeg, Man.

MONTREAL OFFICE and WAREROOMS: **316 Lagauchetiere St. W.**

Head Office: Toronto, Ont., 178 Spadina Ave.



Rogers' Cement

ROGERS CEMENT—a carefully standardized product, ground to the limit of fineness and maintained at a constant standard of constituents.

Rogers Cement should be specified for its speed of set, the excellent concretes it makes, even with a large bulk of aggregates, and the dependability of its action in the forms. These features allow speedy work and prevent many troubles owing to varied action.

To secure absolute satisfaction in concrete construction, see the concrete is made from Rogers Cement.

Mills located at Atwood, Hanover, Kirkfield, Orangeville, Owen Sound, St. Marys and Wiarton.

CRUSHED STONE

WE can furnish crushed stone in all sizes, clean and free from dust, dirt and mold, and graded.

We can guarantee delivery in any quantity. Write phone or wire your orders.

Plants at Dundas and Vinemount

ALFRED ROGERS, Limited

28 KING STREET WEST, TORONTO

Western Representative, N. J. Dinnen & Co., Winnipeg

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Neptune Meter Co.
Union Water Meter Co.

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Garlock Packing Co.

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Steel Co. of Sarnia

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Vulcan Iron Works

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Metallic Roofing Co.
Noble, Clarence W.
Paterson Mfg. Co.

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Durable Roads

For the **highest efficiency** in waterproof macadam road construction—for the most durable, dustless, waterproof, trafficproof roads at the **lowest cost** per mile per year of service—engineers should specify

"Pioneer" Road Asphalt

Road experts everywhere are enthusiastic over their success with "PIONEER."

If interested in **durable** road construction write us for specifications and data.

Build up your old macadam roads by using **"Pioneer" Road Surface Asphalt.** Makes a smooth, rubbery surface—and one application will lay the dust for an entire year! Write for specifications on **Road Surface Asphalt,** also on **"PIONEER" Filler Asphalt and "PIONEER" Paving Cement.**

The Canadian Mineral Rubber Company, Ltd.
503 Canada Building, WINNIPEG

Driwal

Waterproofs Concrete,
Cement Stucco, Stone
and Brick Surfaces

¶ The coatings are all liquids and become effective by penetrating into and filling the pores of the cement; thereby making it waterproof without changing the texture of the surface.

¶ With the fourteen colored coatings the surface can be waterproofed and decorated in one operation.

¶ With transparent Driwal the surface can be waterproofed without changing either its color or texture.

¶ Black Driwal is made in three consistencies to meet the exacting requirements in suitable waterproofing and bonding liquids for foundation walls, tunnels, reservoirs, cisterns, swimming tanks, etc.

¶ Write for illustrated booklet and color card, with specifications and approximate costs.

THE BILLINGS-CHAPIN CO.
BOSTON CLEVELAND NEW YORK

THE STRENGTH OF OAK WITH 40 PER CENT SAVING IN WEIGHT

That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the

"Aurora" Dump Waggon

Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.

Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

Slotted hinges on doors give vertical movement, preventing installing team on dump.

Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

Western Wheeled Scraper Co.
AURORA, ILL.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. - 6,550 Sq. Yds.

COST FOR REPAIRS	1903	$ 0.00	1908	$ 93.26
	1904	3.30	1909	200.46
	1905	9.35	1910	14.07
	1906	37.33	1911	2.29
	1907	16.11		

Total $376.17 or 5¾c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.

Hagersville, Ont. **Limited**

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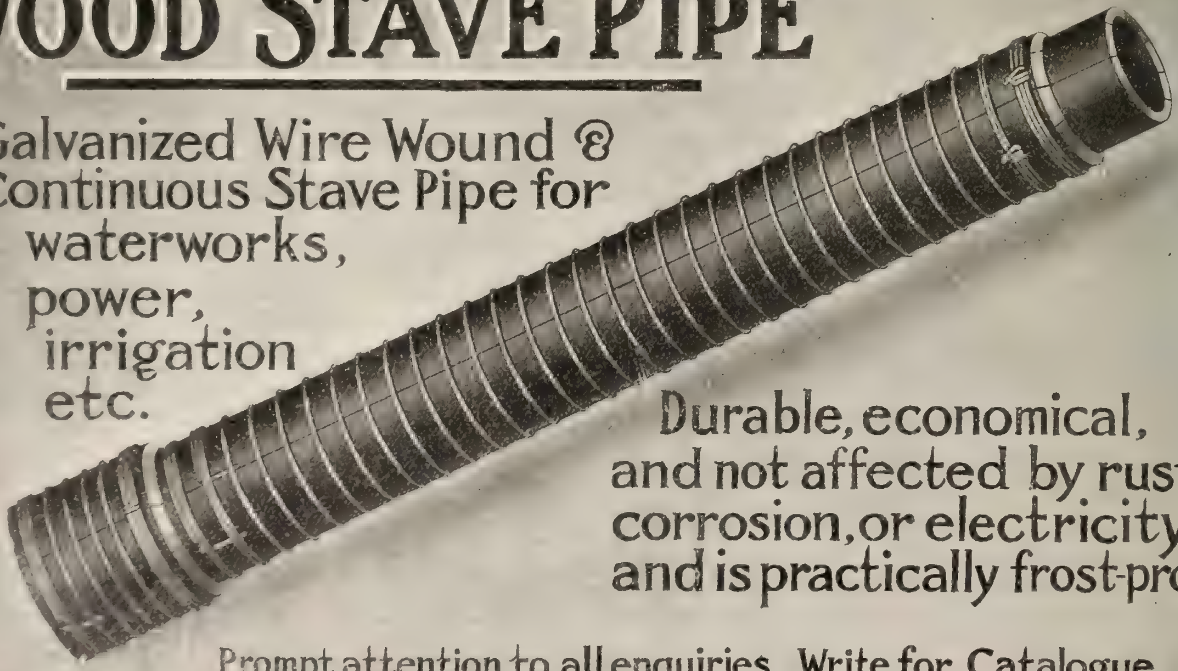

WOOD STAVE PIPE

Galvanized Wire Wound & Continuous Stave Pipe for waterworks, power, irrigation etc.

Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

The Dominion Wood Pipe Company, Limited
New Westminster, B.C.

Tarvia
Preserves Roads
Prevents Dust~

Tarvia Modern Pavement at Mount Pleasant Cemetery, Toronto

Why This Cemetery Wants More Tarvia

In 1909, Mount Pleasant Cemetery, Toronto, built some beautiful roads with "Tarvia X," according to our Modern Pavement Specification. Cemetery roads get hard use from the heavy loads incident to the transportation of monuments, and ordinary macadam fails under such crushing strains. The tarviated macadam, being slightly plastic, is improved by such rolling. 8 Ordinary macadam is not clean enough for pedestrian processions in cemeteries, but a tarviated surface produces no dust or mud and is clean and firm immediately after a rain, shedding water as promptly as a good tar sidewalk.

Tarvia also reduces maintenance expenses, because it wears better than plain macadam under traffic and resists water action on grades.

After three years' trial of Tarvia, the cemetery authorities are paying it the truest kind of testimonial, namely, a repeat order, as per the following letter:

Dear Sir: Toronto, Ont.
I wish to let you know [illegible] "Tarvia X" [illegible]
[illegible]
I [illegible] Tarvia [illegible] stood the test of traffic and heavy loads up to 6 tons the wagon wheels leaving no impression.
Where our roads have a 7% grade we find the Tarvia fills the bill; no washing, no dust, easy to sweep and clean in wet weather.
(Signed) W. H. FOORD, Supt.

Tarvia is made in three grades:

"Tarvia X" for use in constructing roads and pavements.

"Tarvia A" for hot surface application.

"Tarvia B" applied cold, for dust prevention and road preservation.

[illegible]

THE PATERSON MANUFACTURING CO., Limited
MONTREAL TORONTO WINNIPEG VANCOUVER
The Carritte-Paterson Manufacturing Co., Limited, St. John, N.B., Halifax, N.S.

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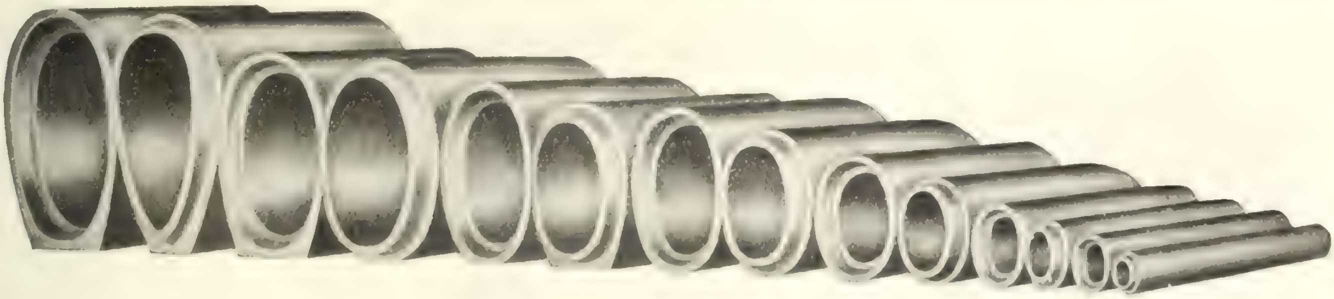

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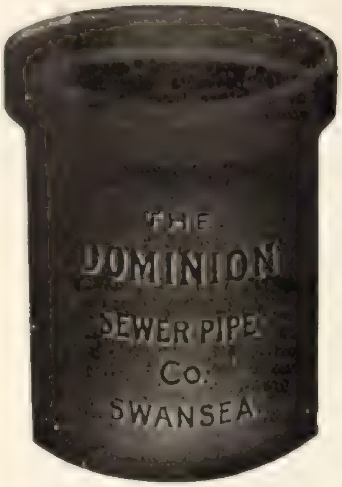

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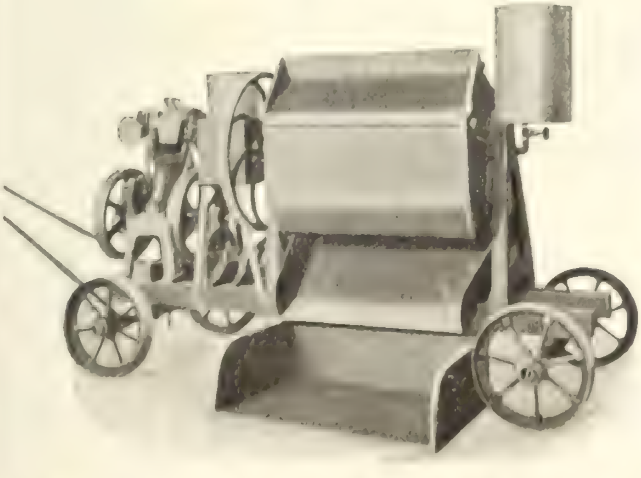

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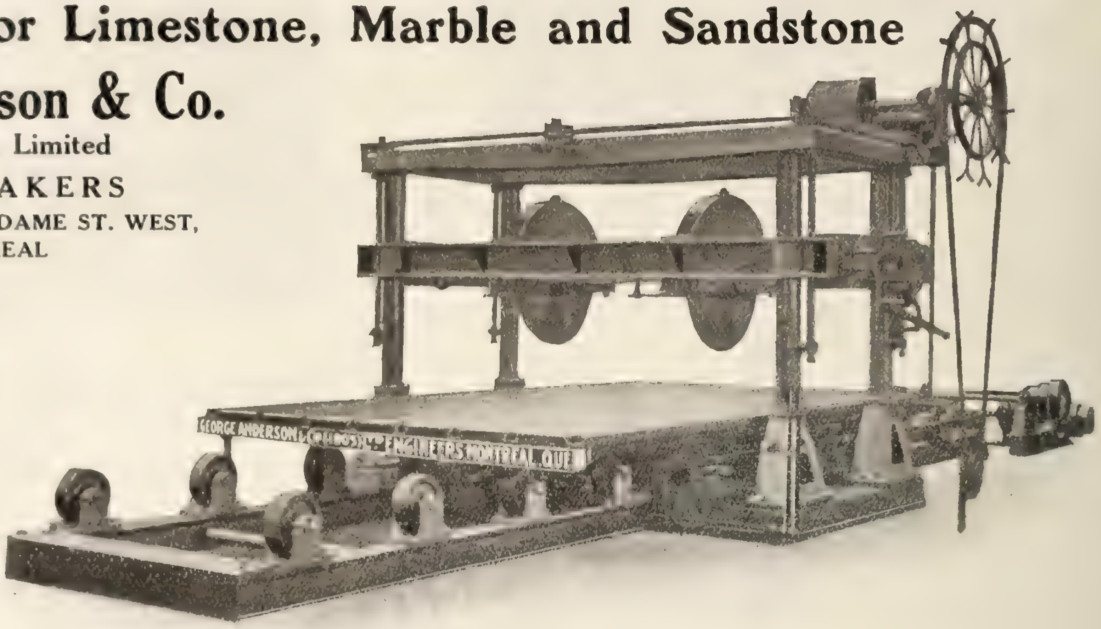

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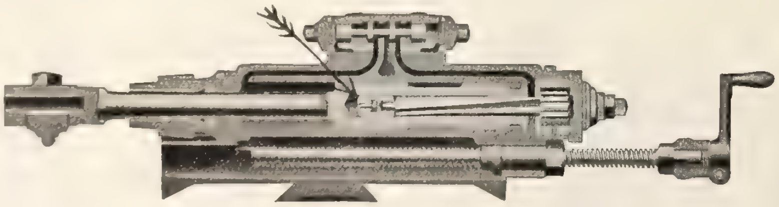

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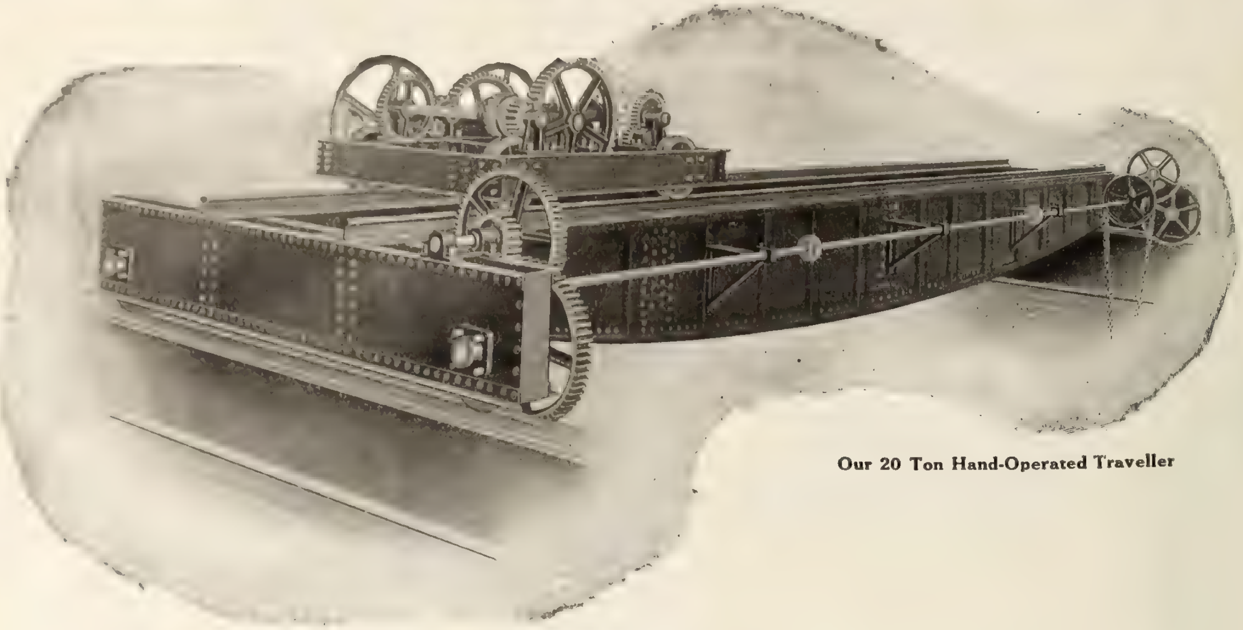

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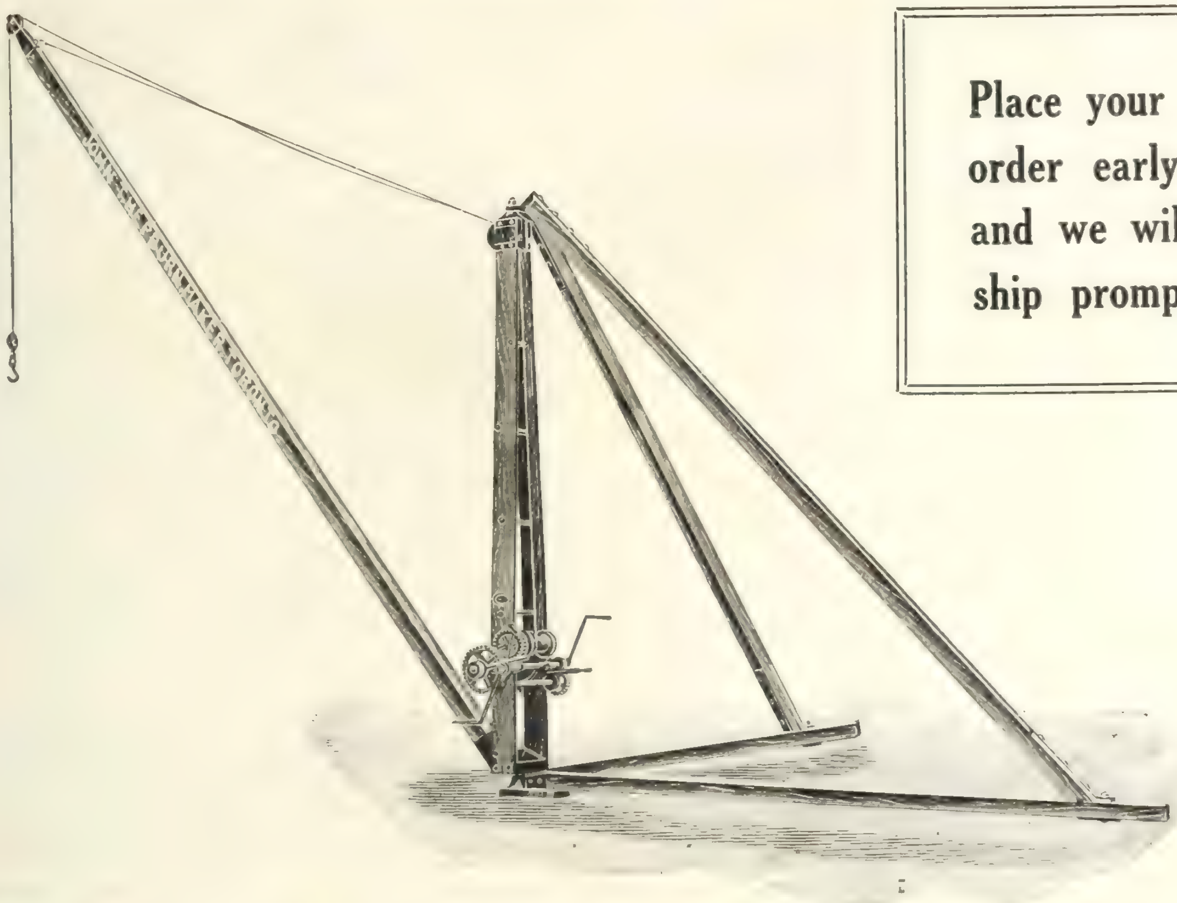
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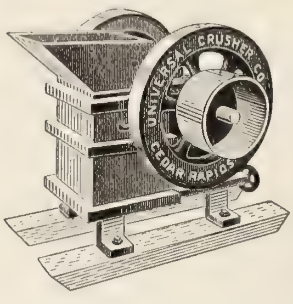
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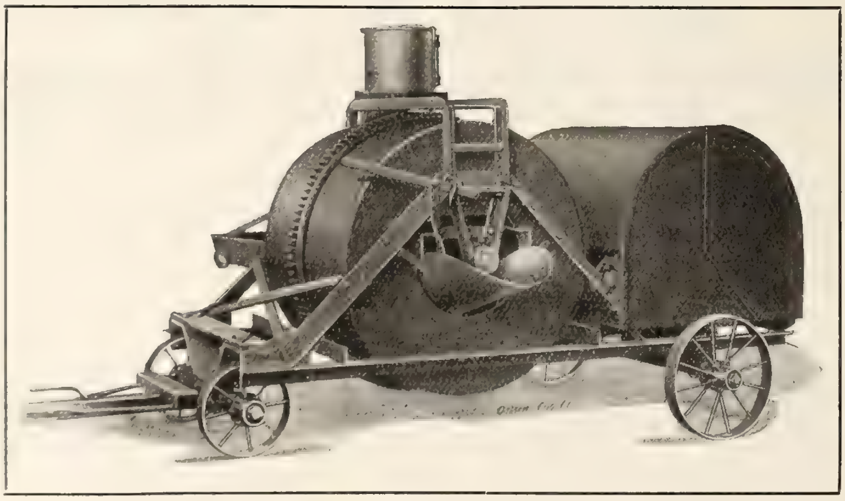

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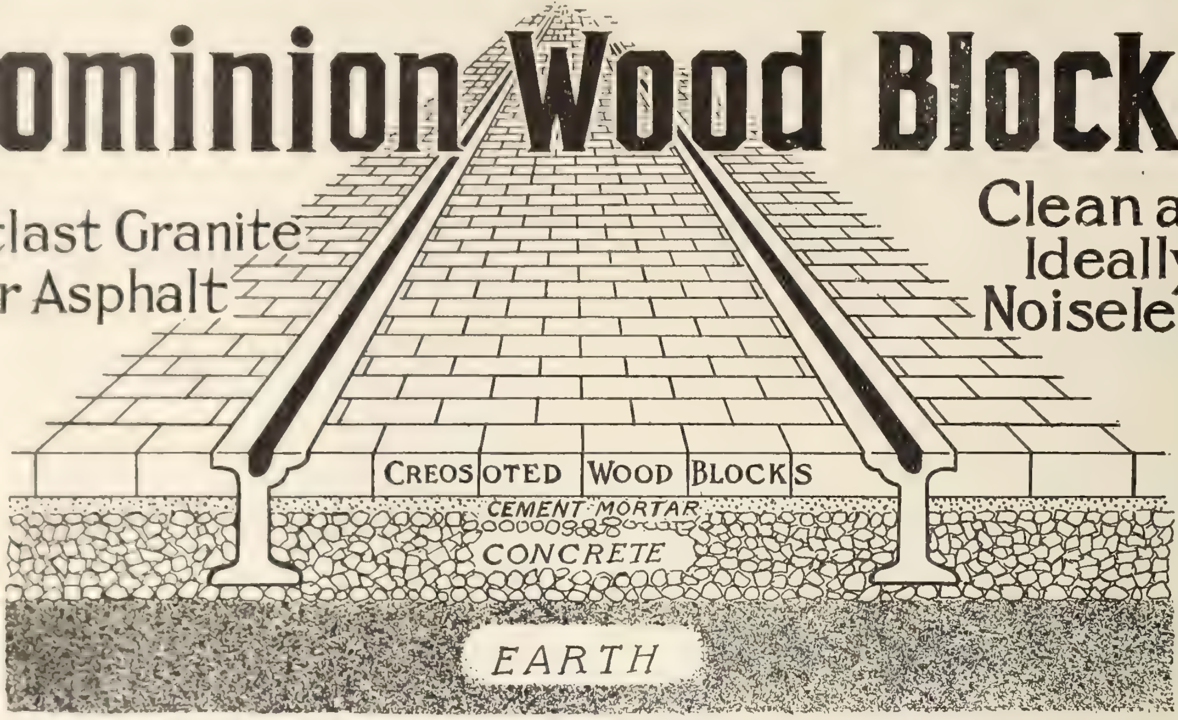

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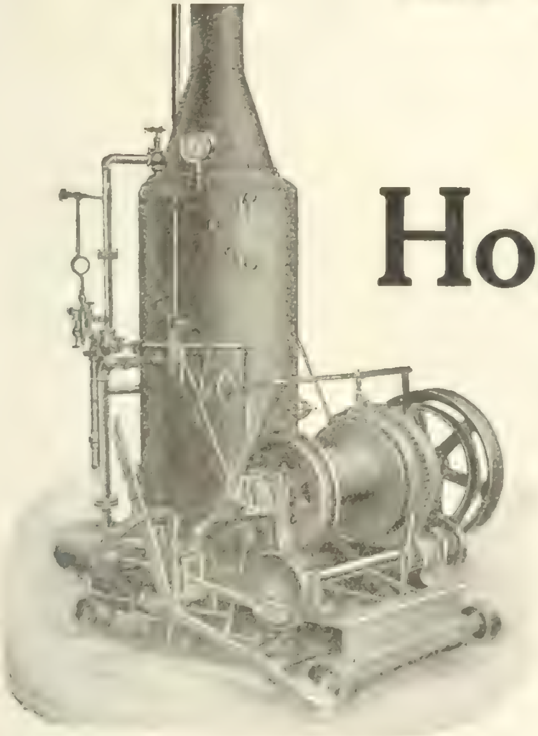

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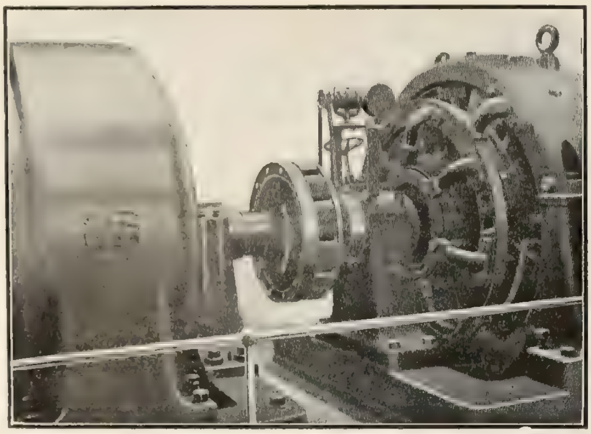

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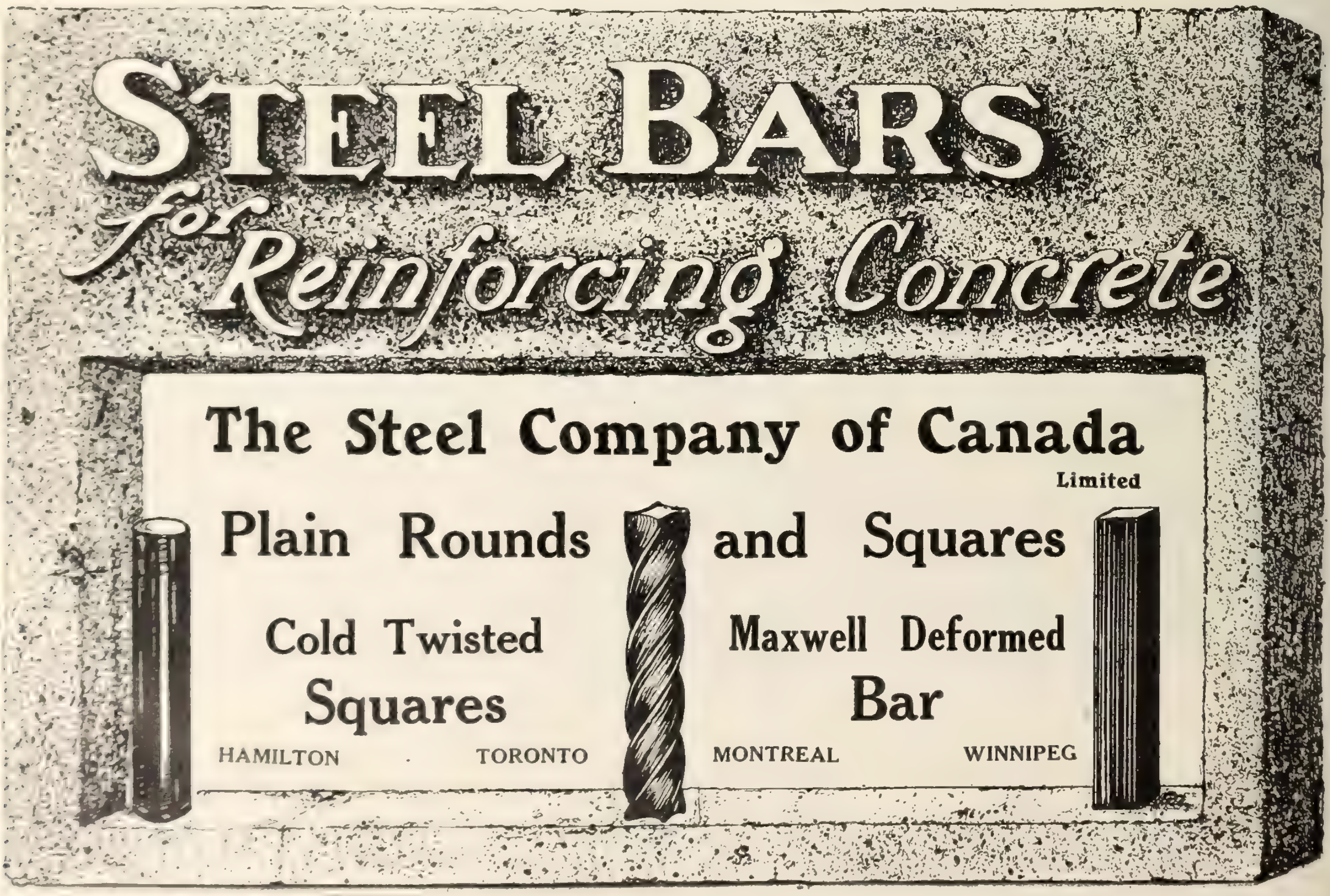

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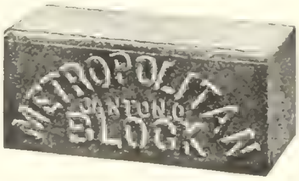

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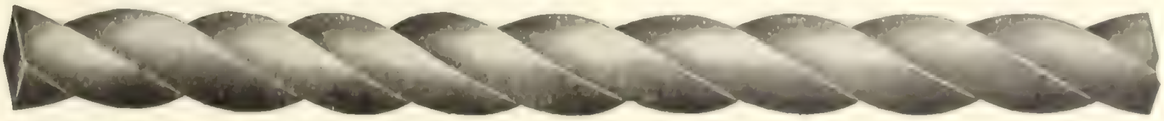

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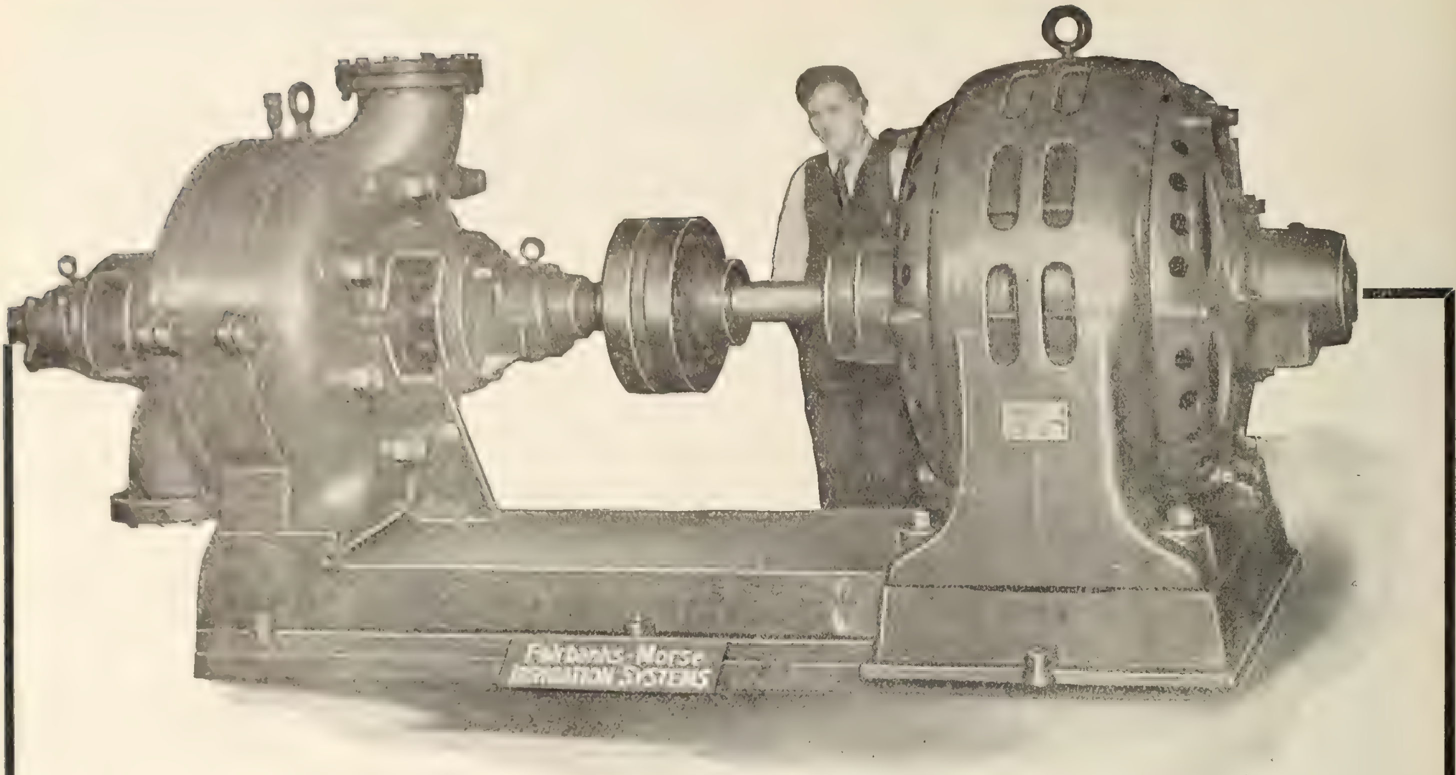

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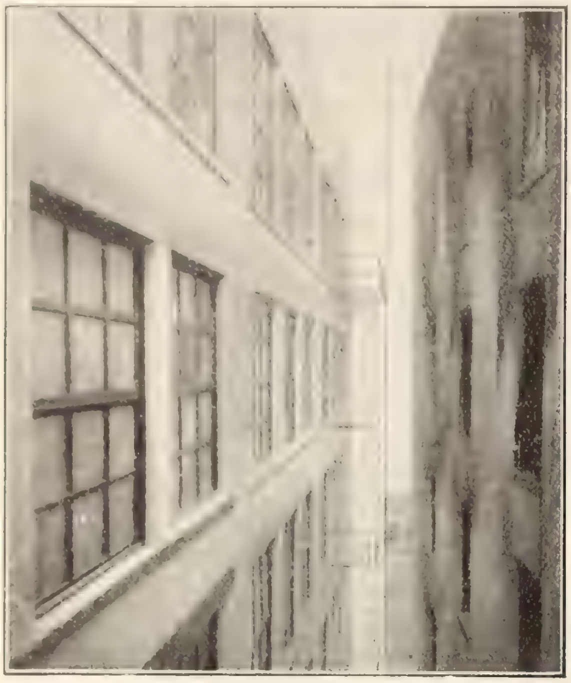

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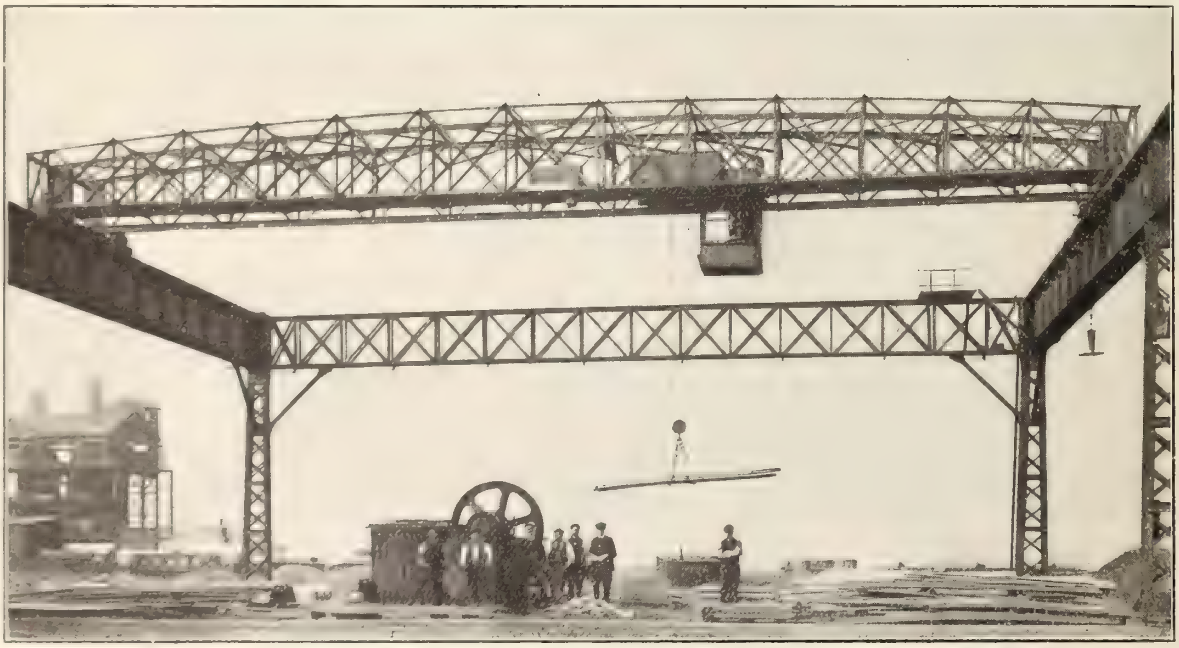

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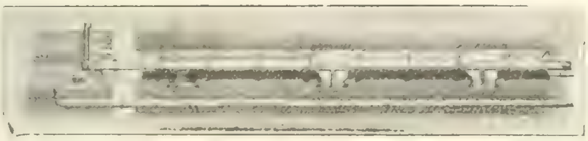

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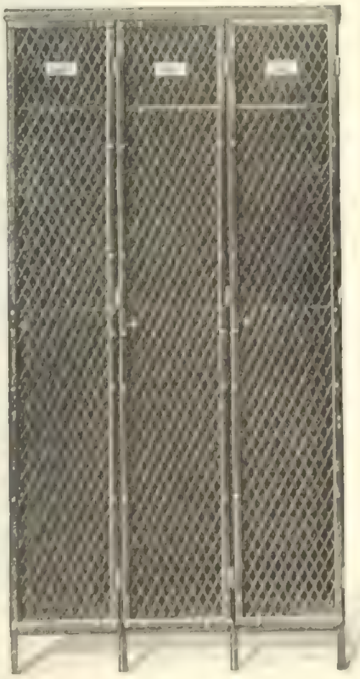

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Vol. 26 June 26, 1912 No. 26

Under-Cutting in Special Lines

THE great thing for specialist contractors to strive against is the insidious manner in which, by the growth of their business, they may devolve from good to inferior and bad work. It is hard to set one's self against taking on work when it is offered, and to continue to have a small output and make a regular profit year after year when it appears so easy to increase; but that will be the most effectual procedure in the end. They should make up their minds to carry out only a certain amount of work which they have the staff capable of doing, and see that they get proper prices. If they do that, they will not need to complain of excessive cutting of prices, and they will be able to go on in a profitable business, whereas the opposite road leads to continual striving to increase the output and cheapen the production so as to enable under-cutting. This tends in a short while surely to reduce the profits for everyone, and to bring the rates down to such a point that few can do work and make a profit.

It has been proved in general contracting work that such a policy is a foolish one, because a few firms are quite unable in the building and engineering industries to freeze out their rivals and secure a monopoly; a combine is quite impossible in these trades. Therefore, everyone in the end loses by such under-cutting. If the specialist contractors are wise, they will be careful not to under-cut, but to maintain a fair price for good work, or refuse to do work too cheaply, with its natural degeneration into shoddy work. In the end the public will appreciate that good work must be paid for; and, fortunately, the engineering and architectural professions are pretty well aware of it; at any rate, the leading members know what is good work, and they are prepared to back the firms that do it.

Publicity in the Contracting Field

THERE is a disposition in some quarters to withhold facts and figures from publication. Little trouble is experienced in the matter of obtaining information from municipalities: the complaint is generally in regard to the larger corporations and particularly railway companies. That they are thus able to defeat the publicity end is attributable of course to their almost invincible strength.

Contrary to what would seem to be the opinion held by certain officials of these companies, it is only due to the contractor to furnish him with full details of the bids submitted on any work or for any supplies. The preparation of his bids represents time, trouble and expense which it would be quite easy to translate in terms of hard cash. He is entitled to know wherein and how he loses his money.

But while these larger concerns are the worst offenders, municipal bodies are not altogether blameless, as may be gathered from the following case cited by a London contemporary—if it is fair to consider British experience:

> A corporation required some specially constructed appliances which are specialized by a limited number of firms in this country. Consequently, instead of advertising for tenders, the municipality decided to invite terms from the known manufacturers. One firm went to a considerable amount of trouble and made a journey for upwards of four hundred miles to visit the council and to make the necessary inquiries. Moreover, a deputation from the council travelled to their works in connection with the price and conditions submitted. The firm did not secure the order, however, and upon inquiry as to the reason, were told that a more favorable offer had been accepted. Particulars were then asked as to tenders received and whether the tender failed in design or price, but the council appeared to take umbrage and said the firm had no right to ask for the information. Thus after all the trouble and considerable expense the firm are refused any information whatever.

This example is not without parallel in this country, but in any case the point would be worth impressing, if only upon the ground that "prevention is better than cure."

We know of no reason why results should not be known and there is every justification for asking that those who have to do with the award of contracts should consider themselves committed to some pains in the matter of giving publicity to the award as soon as it is made. In Canada it is only a general demand on the part of contractors that will establish the general practice of giving everybody a fair opportunity of seeing how his price compares with that of his competitor.

Vacation Employment for Undergraduate Engineering Students

NOW that the long vacation season is at hand undergraduate engineering students will be looking around for something to do. Probably the majority of students will return to their homes as a matter of course, yielding either to natural impulses in that direction, or responding to the need of their services at home. A few will seek employment for the purpose of obtaining funds with which to complete their academic education. To the latter class, says our Chicago contemporary, Engineering & Contracting, we wish to make a few suggestions.

Even at the end of his first year in college the student should secure employment in some line closely allied to the work he expects to take up after graduation. The advantages of such employment are many and far reaching. To begin with, the young man so employed may find out, before it is too late, whether or not he is fitted for the work he plans ultimately to take up. Again, he acquires a practical knowledge of things concerning which previously he has had only vague and inaccurate impressions. After a vacation season spent in this manner he returns to college, sure that he is on the "right track." His studies will now mean much more to him than they did before. He will take an intelligent interest in his work, and will better appreciate the course of study which has been laid out for him. His observation of things in the field will enable him to ask intelligent questions in the classroom when he takes up the study of design.

The student of civil engineering, at the end of his first year, usually considers himself fortunate if he can obtain a position on a surveying party or in a draughting room. If he expects to follow what we will here call the " "designing side" of civil engineering, such a position is just the place for him. However, if he has a liking for the "constructing side" of engineering, he will do well to avoid the surveying party and the draughting room. In that case he should work on some construction job, preferably as time-keeper during his first season, but as a laborer if necessary. An ever-increasing number of technical graduates are going into the contracting business, which is only the constructing side of engineering, and surely there is room for trained men in that field.

Road Work in the U. S.

It is estimated that the expenditure on road work in the United States during the last twenty years has reached the colossal sum of $1,400,000,000. The State and local expenditures for 1911 aggregate $140,000,000, and of this sum about $20,000,000 was devoted to building better highways in the State of New York. In 1906 the Legislature at Albany appropriated $50,000,000 for the purpose, of which sum about $1,000,000 remains, but a bill is now pending to borrow another $50,000,000 to continue the work.

The Government is actually engaged in the propaganda of good roads and maintains four complete exhibits, showing the various methods of road construction, which will be shown at the State fairs and land and real estate exhibitions. One of the most interesting exhibits at the Travel and Vacation Show at the new Grand Central Palace in Manhattan is the Good Roads Exhibit of the United States Government. The exhibition illustrates the various types of road construction and maintenance from the earth road to bituminous macadam and brick, including the sand-clay, plain macadam and bituminous macadam. The exhibit demonstrates the surface treatment, mixing method, penetration method, and brick construction. It also includes a standard road roller and complete crushing plant in actual operation. All the models are built to scale and show each important step in the construction of roads from the preparation of the foundation to the finished road. The exhibit is not confined to the high types of road, but shows the cheaper form of construction as well as the most permanent.

For the purpose of interesting the public generally in good roads, the Government took up the question seriously and officially in 1909, when an exhibit was formed and sent to the Seattle Exposition, where it attracted so much attention that it was shown at Omaha, Chicago, Knoxville and other cities. The railroads then displayed a keen interest in the matter of better roads and operated road improvement trains fitted up for carrying exhibits and lecturing purposes. The trains consisted of cars for exhibit, lectures, dynamo for moving pictures, railroad officials, representatives of the State Highways Department in which the train operated.

THE READER'S VIEWPOINT

The Quality of Construction and the Lowest Bid

Calgary, Alta., June 15, 1912

Editor Contract Record:

In my opinion it is a mistake to have any cast iron rule as to the award of contracts. One of the most important considerations is whether a man is financially able to carry the work to completion. The contractor, like all other men, is subject to mistakes and there is nothing which requires more care than figuring on building. There are so many things to figure that it is very easy to make a mistake. Then again there are men going into the contracting business every day who, while they may have the money to carry on their operations, have not the practical experience and consequently are very liable to error. I think that if there is to be any rule as to the letting of contracts it should be that all tenders should be carefully compared, so that an idea can be obtained of the figure that is nearest the estimated cost of the building. In several cases in my experience where contracts have been awarded to the lowest bidder the contractor subsequently discovered a mistake and had to sacrifice his marked cheque and to a certain extent his reputation. In my opinion this sort of thing is an injustice on the part of the architects or owners who award the contracts. In the case of architects who are asked to prepare plans for, say, a $100,000 building, it is not unusual to find that when the work is figured by eight or ten contractors the price overruns to the extent of $50,000 or $60,000. To my mind this is as big a mistake on the part of the architect as it is when the contractor submits a wrong figure. But the architect is not held responsible for the difference on the plan. He merely changes the plans and makes the necessary reductions. It seems to me that the same thing should be applied to the contractor who makes a mistake in figuring; either he should be given a chance to reconsider his figure or it should be rejected; for there are few men in the contracting business who would not appreciate the rejection of a figure that would certainly entail loss.

Inimical to Best Interests of Construction

Again, it is to the interests of both the architect and the owner to turn down a tender that is too low, for if in such a case the contractor should happen to be unscrupulous he will even up on the building as far as possible, and indirectly it is the owner who suffers in the end. The fair cost of a building should enter into the award. It does not matter who the contractor is or what his ability is: the work must cost so much money and then it is a matter of how much percentage a man can obtain. If a contractor does not get his proper price his only alternative is to take it out of the building or to go down into his own pocket. Therefore, I say, the proper tender to accept is that which is nearest to a careful estimate on the part of the architect.

It may be of interest to cite a contract awarded a short time ago in this city. There were four tenders submitted on the work as follows: $87,000, $85,000, $84,500 and $73,000. Now the contract was awarded to the man who bid $73,000, and while the "successful" contractor is able to complete the work he is certainly not getting an adequate figure for it and he is face to face with exactly the conditions outlined above. I consider that the man who should have obtained the tender was the man who bid at $84,500. I believe that he was in the proper place. In all such cases the final results are problematical and unsatisfactory .

What Inordinately Low Bids Indicate

You ask whether the general quality of construction is adversely affected by the principle of the lowest bid. I claim that it is. In the case of these low bids a contractor either makes a mistake or else he has not got sufficient practical knewledge to figure a set of plans properly. Of course, in some cases the fault lies with the architect, who does not provide sufficient details. But in any case, whoever is in fault, whatever the nature of the mistakes, the quality of construction—as a general rule—must necessarily suffer when the work is obtained at an inordinately low figure. The award of the contract to the highest or lowest bidder should rest finally with the architect, engineer or committee appointed to make the award, after careful deliberation and after a consideration of the estimates and information at hand. I cannot see where any other principle will work satisfactorily.

On the other side of the boundary in places where they passed by-laws making it compulsory to accept the lowest tender provided the contractor submitting the same can put up sufficient bonds or cash as deposit—in default whereof the owner must pay 10 per cent. of the amount of the contract—it was very soon discovered to be detrimental to the interests of the owner, the contractor and general construction.

The principle that seems to have been adopted in the case of the larger buildings in the vicinity of Toronto, namely to award the contract to one of the tenderers of about half way down the list, would seem to be more satisfactory than any hard and fast rule that could be established.

Yours truly,

J. J. DOYLE.

An Explanation from Calgary

Calgary Contractors want a Fair Field—Nothing More

Calgary, June 18, 1912.

Editor Contract Record: Your recent editorial in the issue of May 29th, 1912, wherein you moralize on "Calgary for Calgarians," cannot be allowed to pass without some comment, for, apparently the facts of the case have not been known to you,—nor to others in the "far East" who have followed your lead. As one intimately connected with the situation, the writer is in a position to let the public, as well as the Contract Record, know the true inwardness of the action which has been so misconstrued.

No longer than six months ago, the Canadian Pacific Railway let a large contract, involving millions of dollars of construction in Calgary, to a firm coming into Calgary from the United States, without ever expecting to do other work here. The entire negotiations for this construction proceeded without any regard to the local contractors. No persons in Calgary were asked to submit figures on this work, and so very naturally the contractors here felt slighted. More recently, when the announcement was made regarding the construction to be done here by the Grand Trunk Pacific Railway, it was brought to the notice of the Calgary Builders' Exchange through its members, that at least one construction firm from the United States had its men in the city gathering information for the preparation of an estimate on this work. To the certain knowledge of the Builders' Exchange, no local contractor was asked to figure on this work, hence the action taken, which was entirely to the one end: that by some agitation it might be brought to the attention of the G.T.P. and others contemplating construction in these parts, that the local men were able and anxious to be allowed to figure on such construction. There was no idea of attempting to get this construction, or any succeeding, to the exclusion of persons not connected with Calgary. All that the Builders' Exchange had in view was to be given some consideration when figures were called for, and not to be given works without any competition from others—as one is led to believe from your editorial.

As an example of the manner in which the local men have been slighted in this way, the writer will say that a certain large organization, having under consideration the erection of an office building in this city, called for figures from but one firm of local contractors, and that because of influence brought to bear by their eastern connections. And yet this firm advertise that the money which they got out of Alberta is to be reinvested in Alberta. Is it an investment to ignore one's friends and neighbors? Calgarians do not desire to preclude outside firms from figuring on work to be done in Calgary, but they do object to being excluded from figuring on such work themselves, because they believe that they can do as good work for as low a figure as anyone. And therein lies the stand taken by the Calgary Builders' Exchange. Nothing can be better for Calgarians than to have to meet competition in their own city against the great construction companies of the east and the south, but they want the same chance, at least.

Yours truly,

"A CALGARIAN."

Surface-facing coats of rich concrete for concrete walls are not as satisfactory as walls having uniform mixture throughout, according to the experience of Mr. Lincoln Bush, consulting engineer, New York, related in a memorandum to the committee on masonry of the American Railway Engineering Association. His observations on walls built for the Lackawanna Railroad during the period from 1900 to 1909 have shown that walls built with a uniform 1:3:5 mixture between 1903 and 1909 have given better results than those built between 1900 and 1903, when the practice of that road was to use a 2-in. surface finish of 1:2:2 mixture against a body of 1:3:5 concrete. Defects and shelling off of the face may not take place for two or three years, and may then continue. Where a special surface finish is necessary for ornamentation, he believes it best to obtain it by bush-hammering, treatment with acid, or rubbing and washing while the concrete is green, using crushed stone of proper size to give the desired surface effect.

The Broader Aspects of Civic Improvement

Individual Expression Subordinate to the Civic Expression of the City as a Whole—The Influence of City Planning

By S. D. Adshead

IN the contemplation of a city, we have before us the most comprehensive of the works of man: its solid walls tell us of his stubborn will, its fine facades of his success, its twisted streets of his uncertainty of aim, the squalor of its slums of his defeat. It is in human life that we have the secret of its growth, and man himself is but the reflection of its breadth.

Planned to a preconceived system, we have cities the expression of a strong administration; built up unit by unit, we have in them the presentment of individualism. Here, then, are two methods of city building, or rather a method and a haphazard system. Cities have been planned and built for the people, and cities have grown and been built by the people. Either like Paris and Washington, and the colonial cities of ancient Rome, they have been laid out on regular and orderly lines, or like Rome itself and most mediaeval cities, they have grown fitfully and at odd times.

By many it is claimed that in this latter growth, in the growth that is unfettered and unrestrained, may alone be found the city of true expression; the city moulded of the people who in it dwell. If in the city we look only for the expression of the individual, disregarding altogether the efforts of the citizens as a class, then, indeed, there is justification in the claim for this so-called natural growth.

But in the well-organized city individual expression is subordinate to the civic expression of the city as a whole. Furthermore, just as the city is the expression of the people by whom it is built, so the people are the reflection of the city in whose environment they have lived, and therefore I submit that so great a responsibility as that of city building ought not to be left entirely to individual control. And is it not the appreciation of this, with the vista of possibilities and responsibilities that are therein held, which vitalizes the preconceived plan, and wherein lies the very raison d'etre of Civic Design?

THE PRE-ARRANGED PLAN

No city of importance has ever been deliberately laid out on any but orderly lines. Edward I. laid out regular towns in France, and in England he founded Winchelsea, a town with a regular plan so far as the possibilities of the site would allow.

Athens, in its prime, a city of some 120,000 inhabitants, possessing architects the most cultured and capable that the world has yet seen, should pre-eminently have been a city of orderly design, yet Athens, so fortunately circumstanced, was, apart from the incidental arrangement of her public buildings, entirely without design. An ancient city, she had grown up fitfully and without preconceived plan. But it was not so at the Piraeus, the harbour town, close at hand. Hippodamus was the architect of this town, and we are told that whilst in Athens the streets were narrow and crooked, and many of them little better than passages, in the Piraeus they were broad and rectangular on plan.

The conditions which prevailed at Athens refer with equal aptitude to the great city of Rome itself.

Exacting as Roman taste was in its demand for symmetry and regularity, Rome, in the connecting together of her units, was at every period in her history one of the most picturesque cities in the world. The great vistral effects of Haussmann in Paris, and of L'Enfant in Washington, were quite unknown here; but it must not be understood that they were not desired.

The wealth of gorgeous and gigantic effect which Rome in her magnificence possessed, and which she had accumulated in the course of time, was the work of successive emperors; and whilst each undertaking was in itself a fresh challenge to the superb splendour which luxury set out in stately and symmetrical order could display, at the same time in the connecting together of her parts, the effect, as already stated, was rarely other than that we call picturesque.

In support of this statement, I cannot do better than quote the words of Dr. Lanciani, the eminent authority on the archaeology of ancient Rome. Speaking of the different works of the emperors, he says: "Nero, the successor of Claudius, conceived the gigantic plan of renewing and rebuilding from the very foundation not only the imperial residence, but the whole metropolis; and as the metropolis was crowded at every corner with shrines and altars and small temples, which religious superstition made absolutely inviolable, and as the slightest work of improvement was fiercely opposed by private owners of property, and gave occasion to an endless amount of lawsuits, appraisals, and fights amongst the experts, he rid himself of all these difficulties in the simplest and cleverest way."

"He ordered his favorite architects, Severus and Celer, to draw a new plan of the city, and to draw it according to the best principles of hygiene and comfort." The account goes on to describe his elaborate preparations for allaying the wrath and concern of the inhabitants at the appearance of the conflagration which he had so cleverly conceived, and for whose preparation he had arranged temporary booths and provided food; and it continues: "Even in our age of progress we cannot help admiring the profound wisdom shown by the two imperial architects, Severus and Celer, in designing and re-building the city. The straight line and right angle were followed, as far as could be done in a hilly region, in tracing the new streets and avenues through the still smoking ruins. Hasty and irregular constructions were forbidden, the line of frontage of each new building had to be sanctioned and approved by one of the official surveyors. Large squares were opened in place of filthy, thickly-inhabited quarters. The height of private houses was not allowed to exceed double the width of the street, and porticoes were to be built in front of each one to provide the citizens with cool, sheltered walks in case of rain or of excessive heat. Lastly, wooden ceilings were excluded from the lower storeys of private dwellings, and absolute isolation on every side made compulsory."

But I have quoted enough to show that the ancients appreciated the advantages of having, wherever possible, an organized city plan. The occasions, however, where opportunity was afforded for its realization, were few and far between, and where they have occurred have generally been obliterated at later times; so that the city planner of to-day, in so far as the laying out of the city "in toto" is concerned, has little to learn from an ancient source; yet not so in part.

Rome, in the laying out of her forums, her palaces, her pleasure places, and her public ways, was unity itself; and the adjustment of her symmetrical units, unsymmetrically arranged, offers solutions of problems so varied and of so great interest as to remain to this day a precedent for axial connection unrivalled in the world.

SOCIOLOGICAL ASPECT

A well-planned city is the outcome of a well-organized system of city life, and so dependent is the one upon the other that it would be fitting before proceeding further to sketch out the sociological conditions of a communal existence, and so make the connection the more clear. In no other way can the fundamental requirements of a city plan be properly understood. Let us, then, turn from the city itself, with its hive of industries, its labyrinth of cubicles, and its pulsating arteries, to the citizen, whose physical necessities, administrative abilities, and intellectual activities alone can account for its growth. It is in its system of administration that our interest is mostly concerned. Whether autocratic and inflexible, or democratic and erratic, city administration has even exerted a direct influence on city growth.

AMSTERDAM BASIN AND BRIDGE

An attractive water front, and a dignified and spacious approach to a monumental building have been made use of in Amsterdam

First, then, we have the primary essentials of existence—"food," "home" and "rest"; these associated with a communal existence become conditions of commercial undertaking, habitation, and recreation. In the well-organized city the proper provision for these physical necessities is a matter of first consideration. To satisfy the demand for a home, we get different types of dwellings—the private residence, the tenement dwelling, the apartment house, and the hotel; work demands docks, goods stations, warehouses, factories, offices, banks, markets, and shops; and recreation calls for parks, playing fields, sports grounds, gymnasia, baths, waterways for aquatic displays, rinks, race courses, theatres, music halls, kursaals, and social clubs. Each type increasing in complexity, elaboration, and luxury with the culture and importance of the town.

Ultimately, with proper distribution and communication our city simplifies itself into residential districts, business districts, and commercial zones, park systems, and pleasure places. These are the essentials of communal existence, and it is on the proper provision of these that the physical health and prosperities of a city entirely depend; unless these are amply provided for and well disposed, the moral force and intellectual vigor of the citizen will undoubtedly suffer.

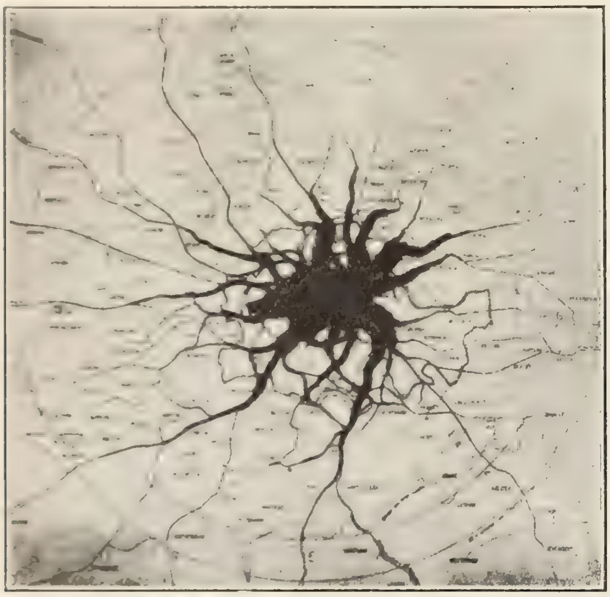
To organize all this and to keep it in healthy relation, moral force must be called into play. Here we get law, order, and custom. Law, the primitive and essential idea of dispensation, gives us in its spiritual aspect the church, and in its temporal aspect the government house, the mayoral parlor, or the seat of law. The higher state, order, calls for organization, and to satisfy its requirements there are needed the executive offices. To assist in the administration of order we need administrative agencies; these conduce to custom and automatic regulation in the conduct of the affairs of the city; and here are called into service all undertakings, commercial or otherwise, in so far as they provide for the better realization of communal organization and which assist in establishing that relationship between the various members of the community which we may rightly term citizenship. Amongst buildings called into requisition by such undertakings may be mentioned railway and tramway stations, police stations, fire stations, power stations, gas and water works, and other municipal undertakings; also elementary schools in so far as their training is directed to the making of good citizens rather than scholars.

BUDA-PESTH—MUSEUM RING

Open space and formal planting about a building add dignity to it and enhance the general appearance of the site

Whereas the executive buildings should be grouped, these administrative buildings should be distributed over the whole city.

We have now the necessary conditions of city life and administrative organization for its control, and we have shown how the various units of the city should be disposed to satisfy these conditions; it only remains to make provision for the acquisition, cultivation, and appropriation of those intellectual activities which are responsible for its intellectual growth. Subdividing these we get states of perception, contemption and imagination. Perception is concerned with the ascertaining of information, for the housing of which are required such buildings as museums, physiological, archaeological, natural history, geological, and botanical; and it may be mentioned in passing that a sharp line should be drawn between museums and art collections. The higher state than perception, contemplation, concerns itself with comparing; here are required competitive exhibitions, and all such buildings as are necessary for comparative consideration and for the testing of results; and amongst these I would suggest a new building: a permanent exhibition which might be of the utmost use, if not in every town, at least in every capital city; not such as exists to collect exhorbitant commissions from sundry exhibitors who can be induced to exhibit and to pay, but an exhibition where exhibitors, after proving to a competent committee the necessity for, and utility of their exhibit, could permanently place it for public comparison with others of a similar kind. How many thousands of worthless patents and how much utterly worthless rubbish, most extravagantly advertised, would thus be condemned.


Diagrammatic representation of rapid transit traffic in and about London, showing the essentially radial character of a city's traffic

The higher state, imagination, demands art galleries, concert halls, opera houses, theatres, and all such buildings as are used for creative expression.

These should as far as possible be arranged in groups.

The building of an entirely new city arranged in accordance with an organized system of city life, such as that which has been briefly outlined, is a matter of rare occasion, even in these days of rapid colonization, And it would seem wasted time and mere dreaming to regard the problem from this impracticable point of view. But this is not quite so. Most of our larger cities, which have grown by leaps and bounds during the period of industrial prosperity that prevailed during the latter half of last century, require pulling down, Haussmannizing, and re-erecting on intelligent lines. This, then, is the work which the municipal authorities and the town planners of the future will be called upon to undertake, and it is in the carrying out of such undertakings that an appreciation of what ought to be will be found necessary before dealing with what is.

THE INFLUENCE OF THE CITY ON CITY LIFE

Having shown how dependent is the development of the city upon city life, and having mapped out the modern city in its highest state of organization, it would be fitting before concluding to make a few observations which will show to how great an extent is the welfare of the citizen himself dependent upon the city in which he dwells. Unquestionably direct planning, convenient grouping, and excellence of effect will reflect back upon the individual citizen and influence his physical, moral, and intellectual growth.

That the planning of the city will influence physical growth is too well known to need comment here. That it can have a moral influence (using the word moral in its strictest sense, as meaning regulation of conduct) is an idea which has had less consideration; but it is very obvious that in the planning of streets and in the grouping of buildings, where these are regular, ample in width, and suited in every way to the purpose for which they are designed, there is not only a saving in actual time in moving from place to place, but also a freedom from that mental worry and anxiety which accompanies all movement amidst irregularity and complication. Consider for a moment the nerve strain, the loss of time, and the exhaustion which accompanies the process of entraining at a station like Waterloo, London; more especially to one unacquainted with its approach and unaccustomed to entrain there. The same observations apply with equal force to other excursions in a city that is without design. The economic advantages in favor of directness and spaciousness in the city plan cannot be over-estimated.

But proceeding to its intellectual influence, this we may aptly dwell upon at greater length. It is expressed in its character and its style, and it is here that the modern city when compared with cities of the past is at so deplorable discount.

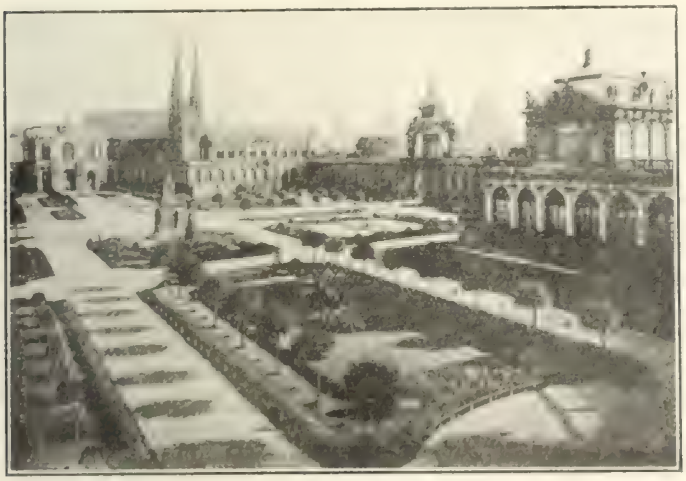
The city is, in the first place, the envelope of its inhabitants; its buildings are their constant horizon and its streets have their daily regard. As such it should exist primarily for their edification, their pleasure, and their well-being. To talk of a city as existing solely for purposes of trade is to talk of mankind as existing for meat alone. In the city of the future, mining,

DIJON—FRANCE. PUBLIC SQUARE AND BASIN
An attractive plan showing an excellent arrangement of planting about a pool

manufacturing, and other necessary but mechanical occupations which are, under existing conditions, smoke producing, accompanied by excessive noise or in which are emitted pungent smells, need not be identified with city life. Improvements in methods of manufacture or in communication will remedy this.

The problem to-day is to express in our civic architecture that character which we associate with all that is best in our highly-organized city life, that city life which pulsates with intense energy, vivacity, polished refinement, and an intelligent perception of all that has come to stay.

In its essential requirements it calls not only for more highly-organized buildings, but for entirely new types. We have wonderful machinery for construction, erection, and rapid completion. We have skilled mechanics standing each by his perfected tools. We have splendid trains, smooth-running trams, and rapid cars. We have city life with a modern character entirely its own. The city itself must express all this. Relegated to the good old days is the city which slumbers 'neath its cozy old roofs, whose windows all mullioned delighted in tiny panes, and whose walls were supported on rough-hewn beams. Such cities were full of charm, but they have passed away; their day has gone never to return.


DRESDEN--ZWINGERHOF
Montreal and other Canadian cities have similar opportunities for such fine, formal treatment

True, our outlying suburbs, our country villages, our places of relaxation and retreat, may still partake of the character of these old-world towns; but in the city proper, where throbs the pulse of modern life, new conditions must prevail. Here, where complexity of existence is intensified by the rapid movement of modern life, greatness of conception must have stringent control. We must have a character about the buildings of our streets which suggests strength held in reserve, and abundance of force most subtly controlled.

Relaxation and riot running must happen but on rare occasion. On what, then, must we base our character and our style? Mediaeval art is too free. True to itself, its leaning towards individual expression in an age permeated with an unhealthy craze for self-advertisement would result in a too pyrotechnic display. What we need is the controlling influence of the Greek; not the architecture of Pennythorne and of Smirke, whose pedantic efforts were confined to the mere reproduction of the Parthenon, the Lysicrates' monument, and the Erechtheum, but the Greek work, or rather the work based on the Greek of earlier men, who, studying the problems of the hour, had placed these first, and then ransacking Greece and Rome, found there the garments with which they could be suitably clothed. Such men were Adam, Chambers, Saone, Cockerel, and Elmes.

From these we must take our cue, and with our new conditions like them return once more to the Greek and to every style which Greek art has directly inspired.

A great city has continuity in its character, and a oneness in its many phases of expression. It is here that it exemplifies the strength of its organization. It is in its tone and color that this is most clearly shown. The city which is white has the greatest refinement and charm. Paris, of modern cities the most beautiful in the world, is a city of ivory studded with pearly grey in a setting of green.

Regent street, London, is painted in white and cream, and to this is entirely due its attractiveness to the fashionable throng.

The city which is white, and which scintillates and reflects the light of the sun, is the only fit background for the brilliant crowd with which every progressive city from Athens to New York has stood possessed.

Cities which are grey, like Edinburgh, suggest rather endurance, grandeur, and romance.

Grey cities are very fitting these humid and northern climes.

All great cities are either white or grey. That which is a golden red harmonizing with the rich green verdure of the surrounding land, will ever suggest ease of existence, simplicity, and primitive life. Such a harmony can never suggest solidity of existence as does grey, nor vivacity as does white or cream.

We who are compelled to live in smoky towns of dull brick and blackened stone can but ill picture the cities of the east. The brilliancy of the cities of China, Hindostan, Egypt, North Africa, Asia Minor, and Greece, seen in the zenith of their existence, with their gorgeous pennants, stencilled cornices, gilded domes, and ivory facades, decorated in peacock hues, is quite beyond any conception of ours. Venice is their nearest approach.

Such coloring has no place in these modern climes, but our colder and more humid cities, were it not for our smoke, could have a harmony entirely their own.

The character of a city is most evident when seen through the medium of its color, but it is also seen through its texture and its form.

The buildings and the outline of the streets, to be a fit complement to modern city life should be regarded in the first place as a background and as a foil. In their form and outline they should be simple and strongly composed. Their surface should be hard and their enrichments delicate to a degree. Such is the street architecture of Paris.

The characteristics of a city expressed in its color, its texture, and its form, reflect on the citizen himself. Its design, the grouping of its buildings, and its outward expression are matters of vital importance to his well-being; and that these should have been left to a blind chance to develop in the past shows a lack of appreciation amongst those responsible for city building difficult to comprehend.

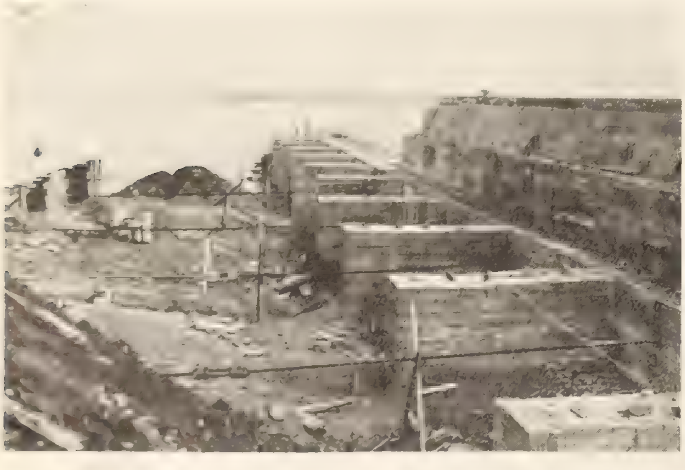
Panoramic view of the scene of operations

Montreal's Great Harbor Development

A Project of National Importance — Excellent Progress being made—Constructional Details of the Work in Hand

FROM a broad point of view, the development of the Montreal Harbor may be regarded as a national work, and is so regarded by the Government and the Commissioners. It has of course its local aspect, but the Commissioners see beyond this and look upon the provision of adequate facilities as a matter of national import. The annual report, just issued, shows the continued growth not only in our trade, but in the additions which are being made to cope with this increasing business. The Commissioners execute departmentally nearly all their own constructional work, and last year saw the largest amount done in any single year. Altogether $2,400,455 was spent on capital account, in addition to $160,765 on maintenance, making a total expenditure by the engineering department of $2,561,220.

The Commissioners have decided on a very ambitious scheme of improvements, and the engineers have been instructed to do the work on the following principles: All extensions to be first-class as regards permanence, equipment, protection, safety and convenience of access; to provide for the traffic already in sight, which means that double the present accommodation will be needed at the end of 12 years; to provide wharves and facilities on the required scale for the very much larger ships which will come with the completion of the 35-foot channel from the sea, already commenced by the Government; to improve the valuable railway situation in the harbor, to make available connections from all points and to take advantage of the non-productive harbor areas, almost in the centre of the business sections; to take advantage of the complete ownership of the water-front and provide a terminal belt-line connecting all points, and so increase the value of manufacturing sites and generally increase harbor business and revenue.

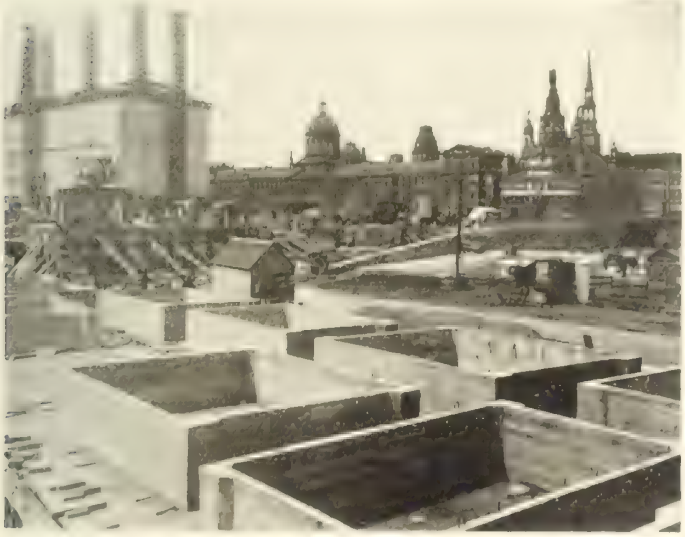


Type of superstructure of concrete quay walls, showing counterforts for shed foundations

The steady growth of the harbor and the constant yearly effort to keep pace with the commerce has resulted in the Commissioners having a splendid plant for the peculiar constructions required, says Mr. F. W. Cowie, B.Sc., M. Inst. C.E., the chief engineer, in an exhaustive review of the year's operations. Dredging plant, tugs, derricks and a shop for repairs, are all kept up to date, and the organization for construction is capable of dredging and placing in the works some two or three million cubic yards of excavated material, of building half a mile of cribwork and concrete quay walls of a height from the foundation to the cope of 60 feet, of building fifty thousand cubic yards of concrete, constructing railways, walls, sheds, culverts, and, in fact, almost every phase of port construction.

Quite the biggest thing of the year was the construction of Elevator No. 2, now nearing completion, under the supervision of the John S. Metcalf Co. Ltd., Montreal. This will have a capacity of 2,620,000 bushels, and is of reinforced concrete throughout. The harbor railway tracks have been extended and improved; while another matter which had the serious attention of the engineers' department was the construction of a large pier for the river passenger and market traffic. In connection with the construction of the quay walls several new features have been employed. The cribwork substructure is built with double face timbers and very great additional strength. The concrete wall of the superstructure is also built of additional strength with new designs for the mooring of vessels. For the first time, a new arrangement has been designed and successfully carried out in connection with the construction of the lower part of these concrete quay walls. The arrangement was the result of experiments carried out under the direction of Mr. Cowie and Mr. Swan, the resident engineer, who are responsible for the new system. Mass concrete deposited in water has always proved difficult of perfect construction, and when the face is imperfect to the least degree in the vicinity of the low water, where the November frosts attack it, the wall, in a few years, becomes eaten away and undermined. Footing blocks of concrete moulded in air have been used for some years. They are quite successful as regards giving a permanent concrete face in the vicinity of low water which is not attacked by frost. The blocks, however, do not fit themselves to the top of the wooden Canadian cribs in such a way as to give the degree of stability or much uniform bearing surface as considered necessary where the heavy concrete retaining wall is founded on timber substructure.

Reinforced concrete shells of an absolutely new design were just tried in Montreal in 1911 and proved fully successful. These shells are 6 inches thick, fully reinforced with steel rods, and the surface glazed and hardened, are made to fit the top of the cribwork. They are in sections about 20 feet long and the full width of the bottom of the concrete wall. A derrick lifts them from a scow and places them accurately in position and when the interior is filled with concrete from the mixer it forms four feet of solid wall above the top timbers and gives a perfectly stable foundation for the wall, with even bearing surface so as not to unduly fatigue any parts of the timber. When the top of the shell is reached the wall is above water and the wall is built as a direct wall in air with a perfect face. It has been found that vertical quay walls are much more convenient for present day ships than walls having an angle, and the quay walls are now designed vertical. This requires careful design for stability, but when completed it obviates much of the danger of either the ship or the crib being damaged under water, as is the case in walls having a batter.



Reinforced concrete shell for commencement of concrete quay walls, from crib-work, in two or three feet of water

The concrete pier foundations for the permanent transit sheds rest on reinforced concrete piles of the Simplex system, the average length of the piles being 35 feet.

A large amount of work was done in providing a site for a floating dock in the lower part of the river. This dock is being constructed in England by Vickers, Ltd., who, through the firm of the Canadian Vickers Ltd., will maintain the dock and a shipyard and repair plant. The works undertaken by the Harbor Commissioners entail the dredging of the basin and placing of all the material in the dump to form the reclaimed land area of 30 acres. Besides the dredging, the outer slope of the embankment, which, in future, will be a continuation of the line of wharves in that division of the harbor, is to be rip-rapped sufficiently for its protection. The quay walls on the three inner faces of the protected basin are being built by the Harbor Commissioners' construction organization of standard strengthened crib substructure, founded 32 ft. below extreme low water and improved concrete quay walls up to 28 ft. above low water. The plant engaged on this work consisted of four and frequently five of the largest and most powerful spoon dredges in the world. In addition to this at work in connection with the filling and grading of the reclaimed land, three to four floating derricks and three land derricks were at work, working day and night.

The Canadian Vickers Ltd., with an eye to the future, have designed all their plant suitable for undertaking all kinds of repairs to all classes of vessels, and their construction launching slip is designed to take in at one time either a full-sized merchant vessel or one cruiser and one destroyer or one full-sized battleship, everything being planned so that this important shipbuilding and repair plant may be equal to any requirement for the repairing or building of ships in Canada.

In addition to the above, the Commissioners carried out a big programme of general improvements, including building an engine house and harbor yard, freight sheds, ferry wharf at Helen's Island; whilst a large amount of maintenance work was also done.

Mr. A. D. Swan, the resident engineer, gives in a separate report, a large mass of details of work executed during the past year.

The new elevator, designed by Mr. J. A. Jamieson, of Montreal, for the Quebec Harbor Commissioners, will cost about $750,000. It is laid out to accommodate two million bushels, but only one million unit will be built at present. The plans provide for facilities for unloading grain from railway cars, and also for unloading vessels by means of a marine leg. It will be of fire-proof construction, steel and concrete, with square bins. No decision has yet been made as to the power system to be employed in working the elevator. The structure now in use is devoted to local trade, while the new elevator will be reserved for export business. With the construction of the Transcontinental, the city is expecting a big stimulus to commerce, and hopes particularly to obtain a satisfactory share of the grain trade. In addition therefore to building a new elevator, the present one is to be greatly improved, by installing a marine leg and elevator system, which will facilitate the unloading of grain from vessels.

An elaborate series of experimental tests recently made in Germany, have demonstrated that when concrete is conveyed considerable distances instead of being poured directly from the mixing plant erected at the building site, it almost invariably shows a very appreciable increase in compressive strength. This effect is more noticeable where the coarse aggregate is broken stone with sharp, ragged edges, than in cases where smooth, round materials like pebbles and gravel are used, and is possibly due to the vibration of transportation adding to the closeness and density of texture of the mass.

Handling Rock Work on Road Construction

A Discussion of Economic and Efficient Methods of Rock Excavation for Road Building—Arrangement of Rock Crushing Plant

By Daniel J. Hauer*

EXCEPT in a few sections of the country, where only sand or clay is found, every contractor engaged in road building has to do with rock work, and at times the larger per cent. of his work is of this class. It is not always easy to solve the problems that arise, as they vary much with every job.

Rock excavation on road construction is sometimes very difficult. For new roads, except when the work is near improved property, it is similar to any open cut rock excavation, except that the cuts may not be very deep. For this, drills and other small tools are needed, as well as small cars, or other vehicles for transportation. On reconstruction of roads the rock excavation is nearly always light, sometimes being only a few tenths of a foot in depth. This kind of work is very expensive and many contractors lose money by naming prices that are little if any higher than that of ordinary work.

Such rock excavation requires expensive drilling as the holes must be put down very close together. Light charges of explosives are needed and many of them, again adding to the expense, and since improved property adjoins all such roads it is necessary to cover the blasts with mats and logs to prevent damage. Accordingly, if ordinary rock excavation is worth about one dollar per cubic yard, then this class of work is worth two or three dollars and sometimes higher. Another item of expense is the amount of rock often excavated for which payment is not made. Upon one occasion the writer was compelled to excavate about four times as much rock as he was paid for and besides had to fill back the extra depth with broken stone, thus being compelled to handle some of the rock twice.

Frequently the small depth of rock is covered with earth, and it is seldom possible to excavate the rock without first stripping off the earth, which may or may not be an extra expense.

Much drilling of rock work has been done by hand owing to the fact that the depth was so light that the cost of moving drills and boilers on the work proved excessive. At present, however, fewer drills can be used, for most public roads have electrical wire strung along them which will furnish power for electrical or electric air drills. These are moved quickly by hand.

For hauling excavated rock, dump wagons are employed, for it is too expensive to install cars, even when industrial track is used, since the amount of rock is generally too small to pay for using cars, unless there is also earth to be excavated. If the earth and rock together are several feet deep and the cuts are long the entire depth can sometimes be drilled and then excavated by means of small steam shovels with a circle swing. For transporting this material either small cars or dump wagons can be used.

The great mass of rock to be handled on any road job is the crushed stone for the metal part of the road bed. At one time it was believed that any stone was adapted for this purpose, but experience has proven that the stone must be selected with care. Fire made rocks, such as gneiss, granite or trap, will outlast a water made rock as limestone or sandstone. For this reason it is not always possible to use local stone, as was once done. In some cases stone is specified from particular quarries. Thus much stone is bought already crushed and the contractor does not have to attend to this part of the work.

At times, though, money can be saved by crushing the rock, and in other cases it is the only method that can be adopted to obtain the stone at a reasonable cost. For these reasons, all contractors should have some knowledge of crushed stone and rock crushers.

Types of Crushers

Crushers are of three different types, each one meant for a different class of work, but these overlap and one type is often used for all classes. The types of crushers are: First, jaw crushers; second, gyratory crushers; third, rollers or cylinders.

Jaw crushers a few years ago were of comparatively limited capacities, but now their capacities have been considerably increased and at the same time their weight and size has been reduced, without affecting their strength and durability. In fact these qualities, too, have been improved, the machines being more compact and many parts being made of stronger and better metal. Even when not mounted on wheels, jaw crushers might be termed portable, for being low and compact they are easily loaded onto trucks and hauled. In many cases these crushers, even the large size ones, are mounted on wheels and can be drawn by two strong horses over good roads, though in rough and mountainous country more horses may be needed. These facts have made jaw crushers very popular among contractors who must frequently, especially on road work, move their crusher plants.

Jaw crushers, however, have one drawback and that is that the size of the stones that can be fed into the machine is limited. This is so of any crusher, yet the size for jaw crushers is smaller than that of others. This means more sledging of rock before crushing, which adds considerably to the cost of crushed stone.

Gyratory crushers are of greater capacity than jaw crushers of the same size, and do their work better, especially when the rock laminates easily and breaks into flat slabs. Such pieces of rock are inclined to slip through a jaw crusher. Gyratory crushers can be mounted on wheels and are thus made portable, but they are heavy and difficult to draw with horses. Little trouble is experienced in drawing them with traction engines. Within the past few years the writer used a fair sized gyratory crusher mounted on wheels in rough country, and had to use a string of from six to ten horses to haul it, and on steep hills had to use blocks and tackle to draw it. Afterwards a traction engine was used to haul this crusher, reducing the cost exceedingly. For large amounts of stone these crushers are to be preferred to the jaw machines.

Roller and cylinder crushers have not been used much by contractors, but their use has been broad and long enough to prove their undoubted merit. The large sizes will take stones of considerable size and by them stone can be crushed to dust in one operation. This is an important factor, as sand is often needed on construction jobs, and with these machines it can be made cheaply. With other crushers the stone must first be crushed in a machine, and then put through a second crusher. This type of crusher is low and compact and possesses many advantages.

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*in The Contractor, Chicago.

Low crushers are always desirable as the cost of feeding them by hand, where stone must be raised, is high. Men do less work in raising material vertically than in any other direction. A platform should be built on a level with the feeding mouth of the crusher, so that the rock may be simply pushed or dumped into the machine. Even with a low machine there is the advantage in having but a small height to raise the rock to the platform. This work should be done by either horse or mechanical power.

Where Money is Saved—and Lost

There is much in the cost of crushing stone in the arrangement of the plant and the method of working the quarry. With a small output these things can sometimes cost double what they should. Often on road construction a quarry is not opened up, but stones are obtained for crushing from fields, old fences and similar places. Sometimes this is more expensive than to quarry the stone. A convenient ledge that does not cost much to strip or develop will allow the stone to be placed at the crusher for a small sum and may cost much less than stone picked up from fields. The writer has known rock that was picked up and hauled, to cost nearly a dollar per cubic yard, when it could have been quarried for less than fifty cents. One steep hill for loaded teams to ascend means to set the limit in the weight of the load, which is the governing factor in the cost of hauling.

For quarrying there must be ample plant if it is to be done at a reasonable cost. One great mistake is in not stripping the rock properly. If rock is stripped, where there is an overburden, this material is only handled once, but let this overburden be shot down into the quarry, as is often done, and it is handled two, three and sometimes even four times. For small quarries scrapers can be used to advantage for stripping and for larger operations graders and wagons or steam shovels. One method of stripping that is seldom used, yet can be used in many cases at a very low cost, is hydraulic sluicing. The rock can be washed off and the dirt carried off in sluices to a place where it is entirely out of the way.

Drilling in the quarry should by all means be done with power drills. One mistake frequently made in small quarries is to do hand drilling and another is to space the drill holes too close together. Thousands of dollars are wasted every year in both large and small quarries, by unnecessary drilling and the excessive amount of explosives used. Few quarry men believe in springing their holes and for crushed stone quarrying use dynamite exclusively. In most quarries springing can be done and high explosives other than dynamite can be used to advantage. The subject of drilling, blasting and other features of rock excavation in quarries, the writer hopes to treat in a separate article at some future time, as it is a subject of importance and one that cannot be covered in small space.

Power must not only be furnished for drills, but also for hoisting and transporting, and at times for lighting, as well as for the actual crushing, and the operation of the elevators and conveyors. Many contractors make the mistake of having individual steam plants for each set of machines. This is a mistake. There should be a central plant for all of this work, as it will be found cheaper both in fuel and labor. Some plants are operated entirely by steam, while others have air compressors and many of the machines are operated by air. If properly done both air and steam can be piped some distance without any great loss of power.

Transporting Material by Gravity

Whenever possible the transportation of the excavated rock should be done by gravity. This is as quick as power and cheaper, making it necessary to handle only the empties by power. The crushed rock should be handled by elevators and conveyors into bins, from which it may be handled by means of gates, by gravity.

Cars are well adapted for transporting the excavated rock from the quarry to the crusher; and with large operations these cars should dump into the crusher; and with large operations these cars should dump into the crushers by means of tipples or bins.

Stone crushing being done on an extensive scale should have a battery of crushers. The rock is dumped directly into a large crusher or a bin serving it. After being crushed by this machine the stone should be carried by chutes to crushers on a lower level to be crushed to the desired size. For the first crusher there must always be some attendance, for the large rock bind against one another, holding the mass in suspension, and men must take long bars or hooks and dislodge them, so as to keep the crushers up to their maximum capacities. This is one use of a bin to feed crushers. With individual loads dumped directly into the machines, there are bound to be times that the crushers are empty, but bins can always be kept full and the crushers fed from them continually.

The battery of crushers, first crushing the large stone and then breaking it into smaller sizes, saves much sledging in the quarry. With contractors, their crushing operations are bound to be more or less limited, so that with them the rock must be sledged into fair sizes, but when the crushing operations are carried on on a large scale it is possible to have a crusher that will take boulders of a half a cubic yard or more. When this is possible the cost of loading cars can be further reduced as the cars need not be loaded by hand but derricks or steam shovels can be used.

Derricks are always useful around quarries. Boulders can be broken up economically by derricks by dropping onto them a heavy weight of a ton or more. Men can become very expert in dropping such weights, and rocks up to two and three cubic yards in size can be broken at one blow into pieces that can be handled, while even larger rocks can be broken up by several blows. The writer has seen rocks of over 5 cu. yds. so broken. In breaking boulders, even with hand sledges, or by these weights or by explosives, it is always well to work with the rift of the rock and whenever possible a hollow place should be under the boulder. These things may seem to the reader small subjects for comment, but they mean much in keeping down the expense of the work. One small detail may mean but little, but a number amount to much money in a year's time.

The loading of the rock in the quarry to be carried to the crusher can be done by the carload or on a bonus basis, no matter whether it is done by hand or machines. Men work with greater zest under such a system and the cost of the work is thus reduced.

Screening the Stone

The screening of stone from the crusher is a matter to be arranged for, as on road and concrete work the difference in sizes of the stone is important. Often on a job several sizes of stone must be used, so the screens must be arranged to separate these and discharge each size into different bins. The dust, which at one time was a waste, is now used and should likewise be run into a bin. All stones that are too large to pass through the rings should be discharged onto a small belt conveyor and carried back to the crusher.

For small plants, portable bins can be used. A number of manufacturers make sets of bins mounted on wheels, which can be moved either by horse or by traction engines. Other bins can be built in sections so that they can be readily knocked down and erected. For jobs lasting some time and where large bins are to be used the bins can be built of some size and as though they were to be permanent. In some cases conveyors can put the stone into stock piles and with other conveyors under these piles the stone can be carried directly to the work or loaded into wagons or cars.

In road construction the crushing of stone can be done in winter time and upon occasions when other work cannot be done, but inasmuch as the stone is not paid for until it is in place, this means that additional capital must be put into the job, and although this may pay on some jobs on others it will not; for on road work in many cases the amount of capital needed is large as compared to the value of the work to be done.

Economy in Building Work

By Sanford Buck

THERE are so many ways to practise economy that we can only deal briefly with some of the more important ones. The price of material, especially lumber, has made it important to watch that item very closely, and we will take this up first.

In the first place, some architects in preparing their plans waste material, or rather cause the contractor to waste it in making the work take unusual lengths. It is a well-known fact that our dimension lumber from the yards comes in lengths of even number of feet. If your architect specifies a certain reach of joists—14 feet 4 inches—as I have had it come to me, you will waste 3 1/3 feet of lumber to each 12-inch joist used, which, at the prevailing prices, would soon amount to an item not to be lost sight of in preparing an estimate.

How to utilize these necessary wastes has become, and is becoming more of a study to keen business men. It is true there are many ways in which this one waste can be utilized. These pieces I speak of, and every large contractor knows we have them, are only a sample from many on any large job. They can be cut the proper length and bevels split and make good bridging for joists, or, on frame construction, can be used for doubling corners, angles or other places where extra thickness is required.

Care of Materials

A great many workmen are very careless in regard to material. One time I had charge of a residence that cost, when finished, $8,000. This was started when I took charge, and the material, I found, was piled, not stacked. There was no system at all; if you wanted studding, you were liable to find it under a couple of wagon loads of roof sheeting or some other place equally hard to get to. The only thing to do was to get some laborers and have every piece stacked separately, so it could be had when needed.

On this same job, where we had just enough 2 x 6's of a long length for rafters, a workman wanting a piece three feet long picked up a saw and cut it off, rather than look for a piece, of which there were many. He was promptly given his time and sent off the job —a lesson to his fellows.

In commencing a building I find it good practice as soon as the ground is surveyed to lay off the foundation and plot the lot for material. The handling of the many kinds of material that goes to make up a complete job are many, and the economical handling of same is of vital importance in this age of competition.

I find it a good practice to have a way left open from street to alley, so a team and load can drive in and drop the load where you have arranged for that certain kind of material.

Have a place for your sand near the source of water supply, or convenient to building, as I have known of extra charges being made by masons, plasterers and bricklayers, on account of having needless work to do, caused by carelessness in locating their materials.

I find that for the economical handling of lumber for a medium sized building, a good way is to have a driveway near one side and pile the lumber end to the building, and each size and length separate, just like most lumber yards; in fact, for a larger building, you would have a miniature lumber yard.

I find, also, that any good foreman or working employer can make a good day's wages by watching and correcting the wastes that occur on the average building of to-day. This, of course, is not true in every case, but there are many chances of improvement on nearly every building you see.

Another good thing to do on any fair-sized job is to have the scraps that fall picked up every day, and those that can be used put in a pile in the building, and those that are of no further use put in some place out of the way and known as kindling. Almost any piece one foot long can be used somewhere, as well as new. Even the cast-away shingle band can be freed of the metal straps and used for furring or back lathing as good as new lumber.

I never could figure it out how some contractors could make both ends meet by having several different kinds of mechanics in a building, when it was not ready for them, as is often the case. Someone pays for this waste of time!

Saving in Scaffolding

The matter of economy in scaffolding cannot be overlooked. Almost all frame buildings can be scaffolded more economically with fixed scaffolds, or rather scaffold brackets, for many reasons.

The material used in a nailed-up scaffold on a good sized house that is wasted through splitting and breaking in taking down, with the extra time over the use of scaffold brackets, will pay for a set of brackets. These brackets can be made of scrap lumber in the winter and be ready for spring when the rush comes.

There is hardly an issue of some of the journals which reach my desk that there is not shown a cut of a house or barn unusual to the locality that does not show the wanton waste of material, in scaffold thrown about promiscuously or trampled under foot.

Experience has taught me that it is economy to buy only the best tools and keep them in proper order.

I once sent a force of eight men to a grindstone run by power, at my employer's expense for time and power, and he agreed with me that it was well spent, as shown by the amount and quality of work as the result.

There are so many places and ways in which economy over the present practices can be made that a good foreman can save his wages to his employer nearly every day, and where we are both foreman and employer, the result is worth the effort.

I venture there are not many who look back over a completed contract but will feel if they had this same job again they would have handled it differently, and with a little more forestudy, in place of so much after study, would make more money and save some of the losses, which are nearly always—lack of economy.—National Builder.

The Philosophy of Purchasing Supplies[*]

By E. C. Church[†]

ABOUT ten months ago I was directed to reorganize the Bureau of Supplies for the Water Department of New York City, and in carrying out the work I have attempted to formulate the principles governing the problem. Briefly stated they are: Get the right materials in correct quantities at the lowest price.

Getting the Right Materials—Many requisitions fail to describe properly the quality of the material needed. There is a tendency to order the highest grade obtainable when the goods are not to be paid for by the man doing the ordering; this is especially true as men seem to feel that it relieves them from responsibility for any subsequent failure of the articles when in service. It is an expensive habit, and except in rare cases requisitions should be filled with articles of the standard commercial grades.

Getting the Right Quantities—Requisitions as received must also be carefully considered to ascertain if the quantities called for are proper; for unless there is an inventory of material on hand one may easily purchase supplies of which there are plenty in stock. I have found that new orders are often based on the orders of previous years irrespective of whether materials so ordered were used and without considering that conditions and requirements have changed in the meanwhile. To this end an inventory of the property of the department is being taken and wherever possible requisitions are filled from stock on hand.

Storage and Care of Supplies—The storage and use of all goods should also receive the careful scrutiny of the bureau of supplies for it is inconsistent to keep accounts of money with great accuracy—and then when the money is invested in stores pay no attention to whether they are used or wasted. Improper storage often results in excessive depreciation. Supplies should be issued in rotation; for when stores are issued in the order in which they are received no old material is left on the back of the shelf to deteriorate and subsequently be thrown out. To carry these ideas into effect storehouses are being fitted up at central points, and a number of specially trained men have been installed as store-keepers.

Consumable and Non-consumable Supplies Compared

I have also divided all supplies into two classes, consumable and non-consumable. Fuel, oil, waste, and lumber are examples of the first class, whereas tools, implements, rubber boots, etc., belong in the second group. As soon as possible it will be arranged that none of the non-consumable supplies will be issued till those they are to replace have been turned in. Thus a man cannot procure a new tool till he has returned the old one and shown that it was worn out.

Specifications—The problem of obtaining the "right material" brings the question of specifications to the front. Multiplicity of styles and types is a disadvantage, and simplification is greatly to be desired and sought after.

Getting Low Prices—In order to obtain low prices a number of things are necessary. First it is essential to have as much competition as possible. To bring this about lists have been prepared giving the names of the firms making the various classes of goods, and then we notify them when we are in the market.

Supply contracts are now so drawn that goods in different groups or divisions, as determined by manufacturing specialization or trade usage, may be bid on separately; for if orders are drawn to contain goods of different classifications the bidders will be "middle men" and "commission merchants," not the makers of the wares not the regular dealers in the various subdivisions in which supplies are customarily bought and sold.

In order to interest the manufacturers and get them to bid it is necessary to purchase fairly large quantities at a time. To do this the department now buys its supplies (except for emergencies) every three months and these new quarterly contracts contain sufficent goods in each class to enable the makers to quote wholesale prices.

Another advantage of quarterly contracts is that where goods are bought in quantities, all to be delivered to some central storehouse, the proportion of the cost chargeable to delivery becomes very small.

Every effort is made to reduce the time which it takes to canvass bids, notify the low bidders and award the contracts, for delay in this respect might cause loss and inconvenience due to possible changes in prices and market conditions.

The new methods have so simplified matters that on the average the time required after the delivery of supplies to inspect them, audit the bills and forward the bills to the comptroller for payment has been reduced from many weeks to less than eight days.

The action of chemicals on concrete is commented upon by Mr. George C. Kennedy, superintendent of the Water Department at Harrisburg, Pa. At the filtration plant hypochlorite of lime is used as a sterilizing agent, and is contained in two concrete-solution tanks, separated by a division wall from the mixing compartment. Both the side walls and division wall showed a great deal of pitting. The bottoms of these tanks, which are of granolithic finish, exhibited no evidence of disintegration. To check the trouble, the sides were cleaned off with compressed air, a coat of cement mortar applied, and the repairs finished with a coating of bitumen paint, applied hot. So far, Mr. Kennedy reports, the protective coating has given satisfaction.

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[*] Condensed from a paper read before the American Water Works Association, June 1912.

[†] Secretary of the Department of Water Supply, Gas and Electricity and Acting Chief of the Bureau of Supplies, New York City.

The Executive Control of Expenditure

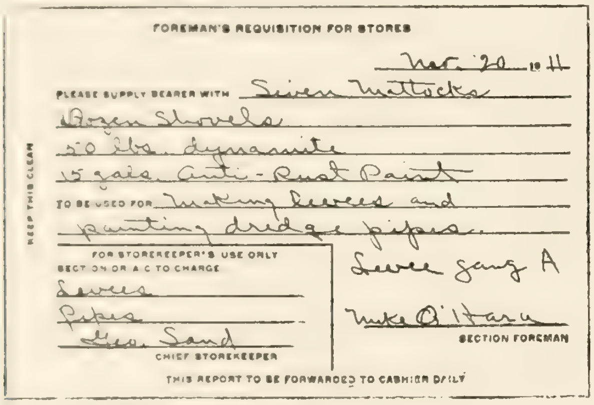
A Construction Company's Systematic Method of Standardizing Outlay and Keeping Track of Various Expenses

By Lindon Bates, Jr.*

IN economical buying lies the possibility of profits in every business. Unless expenditures are less than income, profit is non-existent. And profit is the object of business.

To watch purchases is therefore one of the prime duties of the business executive. He must have a system that will tell him what is being bought, where and at what price, and whether that price is the lowest. And the system must give him a check on the expenditure of every cent.

Nowhere is such a system more important than in building operations. There the purchases are large and varied and they are often far from the home office. Consequently prices and quality are a most important factor. In this article, which describes a system by which the contractor may keep control of purchases, methods are presented that suggest to every business executive how he may increase his watchfulness over expenditures.



FOREMAN'S REQUISITION FOR STORES

Nov. 20 1911

PLEASE SUPPLY BEARER WITH Seven Mattocks

Dozen Shovels

50 lbs. dynamite

15 gals. Anti-Rust Paint

TO BE USED FOR making levees and painting dredge pipes.

KEEP THIS CLEAN

FOR STOREKEEPER'S USE ONLY

SECTION OR A/C TO CHARGE

Levees

Pipes

Geo. Sand

CHIEF STOREKEEPER

Levee gang A

Mike O'Hara

SECTION FOREMAN

THIS REPORT TO BE FORWARDED TO CASHIER DAILY

Form 1—The foreman's requisition for supplies, tools, and so on, made on the storekeeper at contract headquarters—the basis for buying items not in stock.

The executive head of an engineering and contracting firm, who, with contracts that aggregate several hundred thousand dollars, and often several millions, commands machinery equivalent to as much as 300,000 men's labor and ranks as a field marshal in the effective equivalent of the army of toil he directs, must, like a commander, watch not only the battalions at the front, but also his commissary—the purchasing department.

The primary rules of the supply corps are that purchase must be cheap; delivery must be prompt; and the commanding officer must know just how much has been, is being, and will be paid out. The strategic problem is complicated by the exigencies of the detached divisions of his generals—the superintendents of the various contracts. They must forage more or less as they go, buying things locally, and they must be aided or checked from headquarters. These two main factors, the central office and the contract purchasing, make up the contractor's commissary problem.

Organization does not consist in a mass of printed forms for clerks to fill out automatically; it is a system of focused responsibilities. Upon two officers the responsibility rests for supplies:

First, the purchasing agent, whose buying department must guide and direct the purchase and delivery.

Second, the treasurer, whose accounting department is answerable for the making and recording of all payments.

Far down in southern Texas, Tony, the Italian water boy attached to levee construction gang A, is plodding towards the local office of Contract No. 9 with a slip of paper, such as that shown in Form I, signed by Mike O'Hara, foreman. This is the foreman's requisition—the beginning of all things. In this case it calls for a dozen shovels, seven mattocks, fifteen gallons of paint and fifty pounds of dynamite. Tony hands it to the storekeeper. He rides back to the levee gang in the wagon with his plunder, in all probability sitting contentedly on the box of dynamite.

The storekeeper meanwhile enters this delivery on the cards, headed "Shovels," "Mattocks," "Dynamite" (a sample card is illustrated in Form 2), which give a perpetual stock inventory of each item on hand. This done he files the foreman's note to be handed in to the cashier that evening so that the proper charge may be made against the items of "Canal and Pipes."

In this instance the storekeeper notes that there are but three mattock handles and only a half barrel of paint left on hand. To be short on the paint is not so bad—a barrel in reserve is enough and a new supply can be started. But to be caught with only three mattock handles is almost a crime. Verily the storekeeper should not have let such a situation arrive. But contract storekeepers, taking them as a whole, may be relied upon to get caught on something a sufficient number of times a year to make delightfully interesting the life of the contract superintendent, who is now brought into the game. Lack of decision is not generally a failing of the individual who has fought his way up to this latter command. "Phone to Black & Hill at Cayuga to send two dozen handles along to-night," he directs peremptorily.

When the mattocks arrive the pressing necessity has been met. But the situation has in it the germs of trouble. Telephone orders are too superficial; there is a lack of record and careless buying may result. The worthy Black & Hill may believe that they heard ordered a number of things which the superintendent decidedly does not remember. The central office has no record of what local indebtedness is being created. Hence, while preserving the authority to act quickly in such an emergency as this, the machinery of a system must be brought in as an indispensable safeguard.

The telephone request is made first, the price asked and jotted down and the shipment started. But then the contract order, the full record of the transaction, quantity, description, for which gang or machine intended, unit price, discount and amount is made out (Form 3) and furnishes not only the record, but also the sole basis of payment. This is started as soon as the confirmatory order has been tapped off by the stenographer and indorsed by the superintendent's signature, thus pinning down upon him the primary responsibility for the advisability of the purchase and the price.

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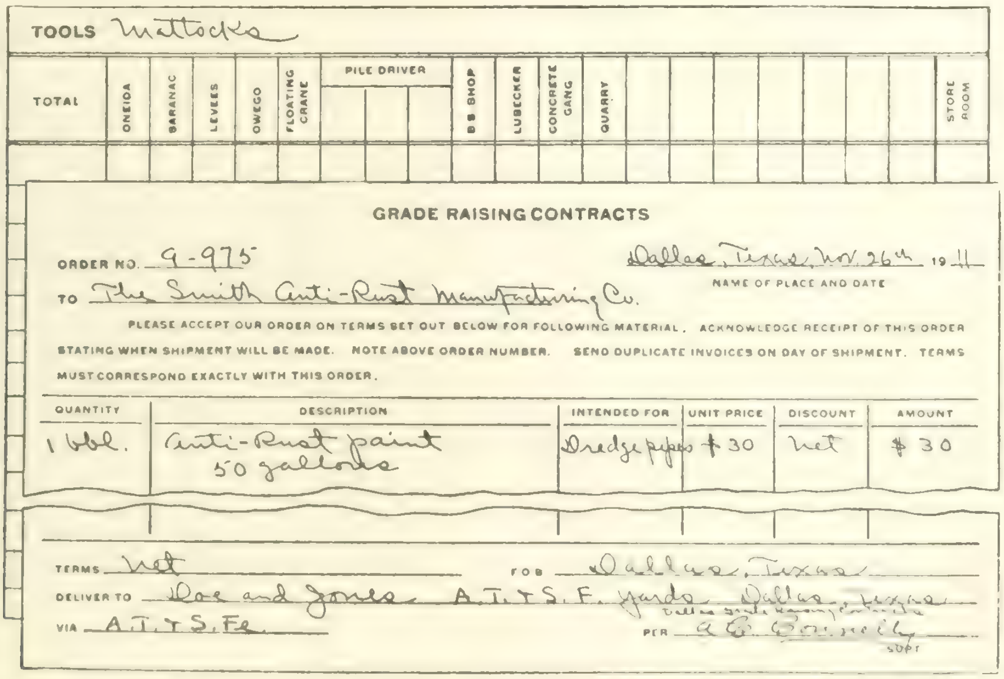
*[illegible] from "System."

The first copy of the contract order, printed on white paper and mailed to Black & Hill, is the official order for their goods to which their invoice must correspond. The second copy, on blue paper, stays in the contract files as the local record. The third and fourth copies, on yellow and pink paper respectively, go to New York, and give the central executives a check.

The first supervision of these orders in New York is made by the general manager. The inspection by this officer, who is in close practical touch with the work, puts his hand on the control lever of all purchases. He wants to know that too much material is not being purchased. Looking in the "intended for" column, he sees for what plant, unit or gang the purchase was ordered. If the volume of purchases for "grubbing stumps" seems to him unduly large, he can call upon the accounting department for a list of all purchases charged to this item and ask questions very much to the point concerning the sixty shovels that the totals show were charged to that item in the previous two months.



TOOLS Mattocks

TOTAL	ONEIDA	SARANAC	LEVEES	OWEGO	FLOATING CRANE	PILE DRIVER			B S SHOP	LUBECKER	CONCRETE GANG	QUARRY								STORE ROOM

GRADE RAISING CONTRACTS

ORDER NO. 9-975

Dallas, Texas, Nov. 26th 1911
NAME OF PLACE AND DATE

TO The Smith Anti-Rust Manufacturing Co.

PLEASE ACCEPT OUR ORDER ON TERMS SET OUT BELOW FOR FOLLOWING MATERIAL. ACKNOWLEDGE RECEIPT OF THIS ORDER STATING WHEN SHIPMENT WILL BE MADE. NOTE ABOVE ORDER NUMBER. SEND DUPLICATE INVOICES ON DAY OF SHIPMENT. TERMS MUST CORRESPOND EXACTLY WITH THIS ORDER.

QUANTITY	DESCRIPTION	INTENDED FOR	UNIT PRICE	DISCOUNT	AMOUNT
1 bbl.	Anti-Rust paint 50 gallons	Dredge pipes	$30	net	$30

TERMS net
F O B Dallas, Texas
DELIVER TO Doe and Jones, A. T. & S. F. Yards, Dallas, Texas
VIA A. T. & S. Fe.
PER A. E. Connelly
SUPT

Form 2—(upper) Headquarters stockkeeper's tool-card: when made out for each item or tool, it gives a perpetual inventory of the number of tools in the storeroom and the number out on each contract job.

Form 3—(lower) The order for supplies that are purchased locally; two copies go to the central office to be checked for price and quality by the purchasing and engineering departments.

If the prices look too high—eighteen cents a gallon for 68 deg. gasoline, $2.10 a dozen for the mattock handles—he can call upon the purchasing agent for his schedule of prices and see just what each other contract and the central office are paying for these supplies and go to the heart of the price question. Having inspected these orders, the manager passes the yellow copy to the purchasing department, the pink copy to the accounting department.

Along the wall in the purchasing department is a row of files. Each one contains the outstanding yellow contract orders, filed by the consecutive local number—Buffalo, Order [illegible], Contract [illegible], Order [illegible] It is the responsible officer's first duty to keep up from these the comparative price records, to see that a superintendent is not paying thirty cents for oil on one contract when on the others it is purchased for twenty-eight cents. This margin on purchases means very much indeed when the imposing totals are footed up. It may be that the local bosses are buying carelessly or without knowing of an altered market. The manager must camp on their trail with the eyes of a lynx.

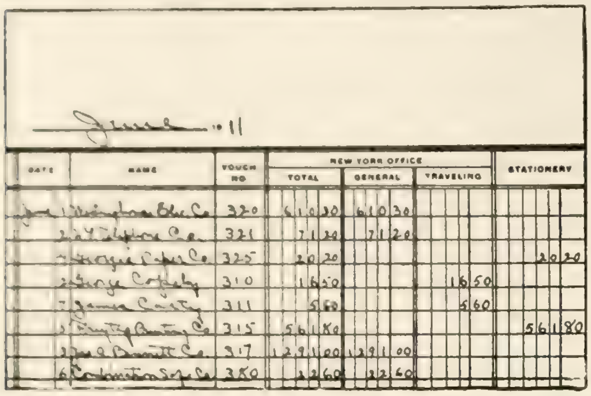
Next he must regulate the volume of contract purchases. As a general policy, it is bad to buy oil, for instance, locally. The central office that makes purchases in bulk, with the club of "big business" which may be made so effective in beating down prices, is almost always the best buyer. A contract superintendent who, through lack of foresight or care, has let his stock in standard supplies fall so low as to be obliged to purchase hurriedly at local stores what should have been gotten from the central office needs to be pulled up short.

Yet this relative dearness is not invariably the case. Sometimes local firms, as agents of the bigger supply houses, quote cheaper prices than the mother company, which refuses to cut into their local business. Thus the prize of cheap buying is to him who knows. It is the purchasing agent's business to be the man who knows, and, tracking the local purchases with his yellow copy, to keep a constant touch on local buying efficiency.

Meanwhile the accounting department has entered the sums recorded on its newly received pink order copy in the "outstanding indebtedness register." By the sums on this, the executive can tell the entire indebtedness for all the contracts incurred down to the moment the last order came in. The pink copy is spitted in a temporary open file to wait the advent of the certified invoice from the contract.

We can leave the purchasing department with its rack of impaled yellow orders and the accounting department with its similar row of impaled pink orders, for the contract cashier who has just received Black & Hill's invoice has checked up and audited the items, has stamped it, making entries recording the terms, the account heading to which the goods are to be charged, and the total amount due on the invoice after all deductions.

Two days later this invoice with a dozen others like it is in the purchasing department of the central office. A clerk here takes from the rack the yellow copy of the order corresponding to the invoice, compares them, and then passes his yellow follow-up copy to its final resting place in the main files, where it is put away under the consecutive contract number. The invoice goes to the accounting department and here is again checked against the order of which the pink copy is on file. Every addition, every discount is calculated with great carefulness. It is readily seen that with such a system as this, the payment of duplicate or erroneous invoices is almost impossible. Each invoice must run the gauntlet of the contract audit, the purchasing department and the accounting department, each of which has an interest and rivalry in checking the others up.



June 1911

DATE	NAME	VOUCH NO	NEW YORK OFFICE TOTAL	GENERAL	TRAVELING	STATIONERY
June 1	[illegible] Elec. Co.	320	610 30	610 30		
2	N.Y. Telephone Co.	321	71 20	71 20		
	[illegible] Paper Co.	325	20 20			20 20
2	George [illegible]	310	16 50		16 50	
7	James [illegible]	311	5 60		5 60	
5	[illegible] Printing Co.	315	561 80			561 80
3	[illegible] Bennett Co.	317	1291 00	1291 00		
6	[illegible] Supply Co.	350	22 60	22 60		

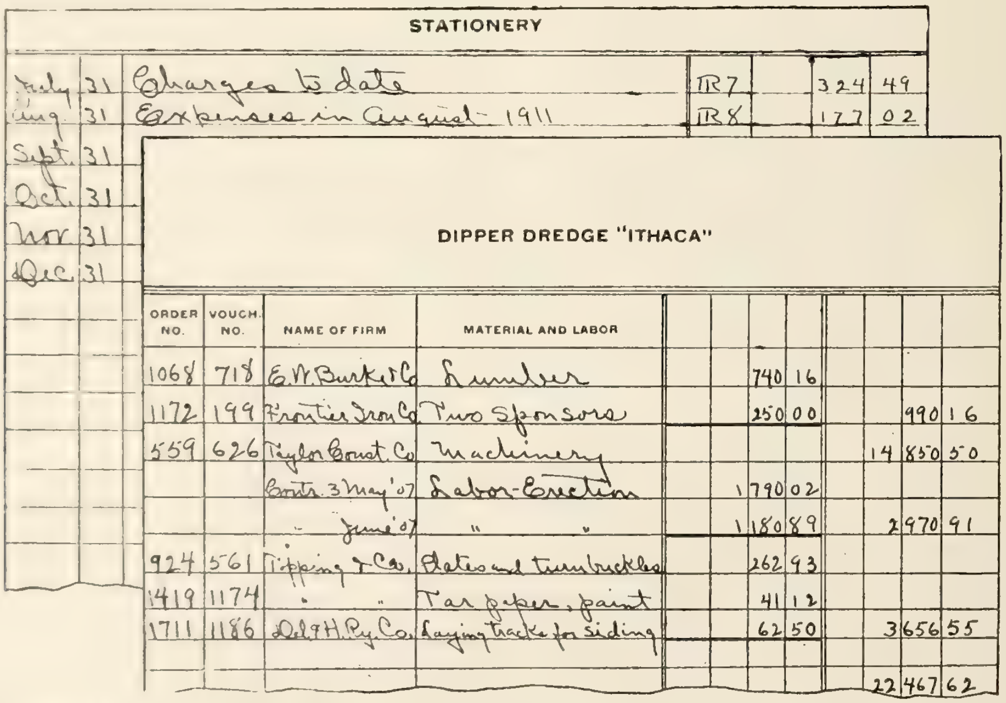
Form 4—A portion of a page from a voucher record book. Every invoice received is entered here as well as under the proper heading in the main ledger.

When footings and extensions have been verified, an entry into the "Voucher Record Book," shown in Form 4, is the second step in the accounting room cycle. The invoice is entered by date and the charge distributed to one of the following accounts: General Office, Traveling Expenses, Printing and Stationery, Salaries, Contract 1, Contract 2, Contract 3, and so on.

The function of this "Voucher Record Entry" is to have jotted down as it enters the department each record of indebtedness. When it is closed up monthly its totals make up the ledger.

The subsequent entries into the "Book of Contract Plant" or the "Book of Contract Distribution" (as illustrated in Form 5) are mainly as records of cost for future reference and not an integral part of the payment checking system. The former records the initial machine costs; it receives the record of every voucher for charges to the "Plant Account," so that for every dredge, tug or machine there is a record—first the initial investment and, second, every further expenditure increasing the value of the machines. The installation of a fuel oil system instead of cold on a suction dredge, since this is destined to increase its output, becomes a "Plant Expense."

But the "Contract Distribution Book" receives vouchers charged against the replacing of wornout boiler-tubes and grate-bars, which are renewals and yet are also operating costs. The titles of this distribution book are so arranged that the cost of every different class of contract work can be segregated. There is, for example, a ledger heading "Hydraulic Dredge, Oneida" under which all expenses charged to the machine, save additions to its essential structure, are entered—coal, waste, supplies, all expenditures going to make up the running cost of that machine. The pay-roll likewise has on a separate sheet, "Hydraulic Dredge, Oneida." Just what the operation of



STATIONERY

July	31	Charges to date	R7	324 49
Aug.	31	Expenses in August 1911	R8	177 02
Sept.	31			
Oct.	31			
Nov.	31			
Dec.	31			

DIPPER DREDGE "ITHACA"

ORDER NO.	VOUCH. NO.	NAME OF FIRM	MATERIAL AND LABOR		
1068	718	E. W. Burke & Co.	Lumber	740 16	
1172	199	Frontier Iron Co.	Two Sponsons	250 00	990 16
559	626	Taylor Const. Co.	Machinery		14 850 50
		Contr. 3 May '07	Labor-Erection	1 790 02	
		" June '07	" "	1 180 89	2 970 91
924	561	Tipping & Co.	Plates and turnbuckles	262 93	
1419	1174	" "	Tar paper, paint	41 12	
1711	1186	Del. & H. Ry. Co.	Laying tracks for siding	62 50	3 656 55
					22 467 62

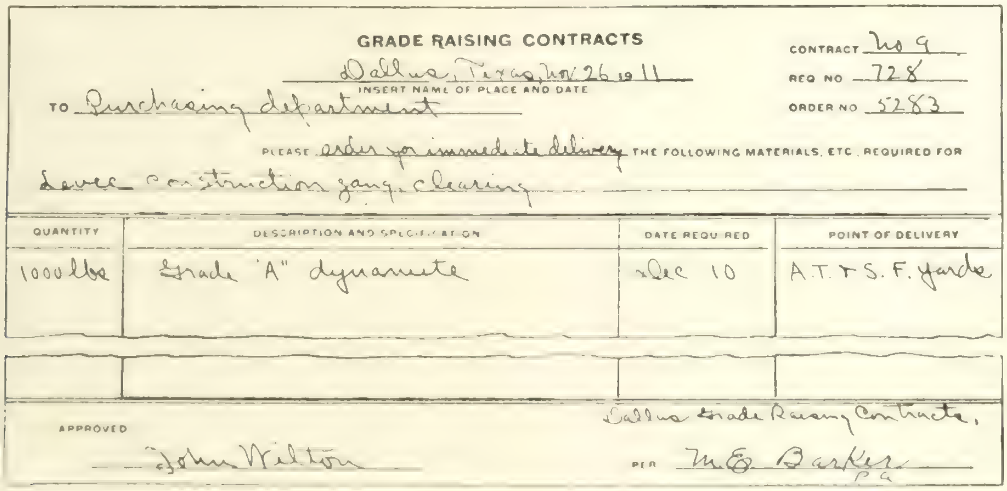
Form 5—The sum of the vouchers distributed to each ledger account is posted monthly from the voucher record book for the comparison and summarizing of purchases made.

Form 6—Each unit of equipment—dredges, locomotives, and so on—has its individual account in the plant ledger. Anything which adds to the productive value of the machine is considered plant expense.

dredging with such a machine has cost for the month, is known by adding the material cost from the ledger (Form 6) and the labor cost from the payroll. When any other similar work is undertaken, the price can be scientifically adjusted to actual expenses. Thus the true cost data for all contract operations are reached.

Having been entered into these two "Cost Record Books," the invoice of Black & Hill is attached to the pink order and is stowed away temporarily to await payment day with all the other Black & Hill invoices and orders for the month to date. At this time the voucher checks for the payment of the monthly account are made out from the audited invoices and orders. The record of the payment is entered in the Cash Book. This completes the cycle of payment in the accounting department, and nothing is left save the filing.

The pink copy is put away by its consecutive number. The invoices attached to the voucher (which is a carbon copy of the voucher check by which payment is made) go in a "Firm Name File" under Black & Hill, initialed by the chief clerk of the accounting room, thus defining his responsibility for the correctness of the extensions; when Black & Hill deposit the check, their endorsement becomes the receipt in full for the materials or services.



GRADE RAISING CONTRACTS

CONTRACT No 9

Dallas, Texas, Nov 26 1911
INSERT NAME OF PLACE AND DATE

REQ NO 728

TO Purchasing department

ORDER NO 5283

PLEASE order for immediate delivery THE FOLLOWING MATERIALS, ETC., REQUIRED FOR Levee construction gang, clearing

QUANTITY	DESCRIPTION AND SPECIFICATION	DATE REQUIRED	POINT OF DELIVERY
1000 lbs	Grade "A" dynamite	Dec 10	A.T. & S.F. yards

APPROVED John Wilton

Dallas Grade Raising Contracts,
PER M. E. Barker
P.A.

Form 7—The contract superintendent's requisition for supplies to be purchased at the central office. Headquarters buying is on a basis of these contract requisitions.

But while these things have been progressing in one part of the mechanism, what is being done about the dynamite that Contract 4 was going to get filled by the central office? The contract superintendent has made out such a requisition as shown in Form 7, which now lies on the general manager's desk. "The last stuff we got from the National Explosive Works was poor; what price does DeLong make for that grade?" he is asking.

The purchasing agent, who has been summoned to report on the question, says, "Three cents higher."

"Well, tell them we'll give them this order if they meet our old price."

The purchasing agent returns to his department with the two copies of the requisition from Contract 7, No. 591. One, the white copy, is put in an open file with all the other requisitions from that contract in numerical order. The second, a yellow copy, the purchasing agent retains in his desk tickler file.

He now calls up by telephone the reperesentative of DeLong and a conference is arranged. After more or less persuasion, DeLong does agree to meet the old price, and a "Central Office Order," based on the specifications of the yellow requisition, is made out. On this order are recorded all the terms of the transaction, date, number of requisition and description of goods; the whole is signed by the purchasing agent and is endorsed by the general manager. A blue copy goes to the contract manager to advise him of the transaction, the white copy is sent to DeLong, the pink copy goes to the accounting department for its entry of "Outstanding Indebtedness," and the yellow copy stays with the purchasing agent as a tickler until the invoice comes in to be inspected and is sent to the contract manager to be checked there against the goods delivered. The yellow copy, when the invoice returns, goes to the main files and the audited bill to the accounting department.

What are the results of this system? For the requirements of modern business measure everything against the inexorable standard of effects achieved.

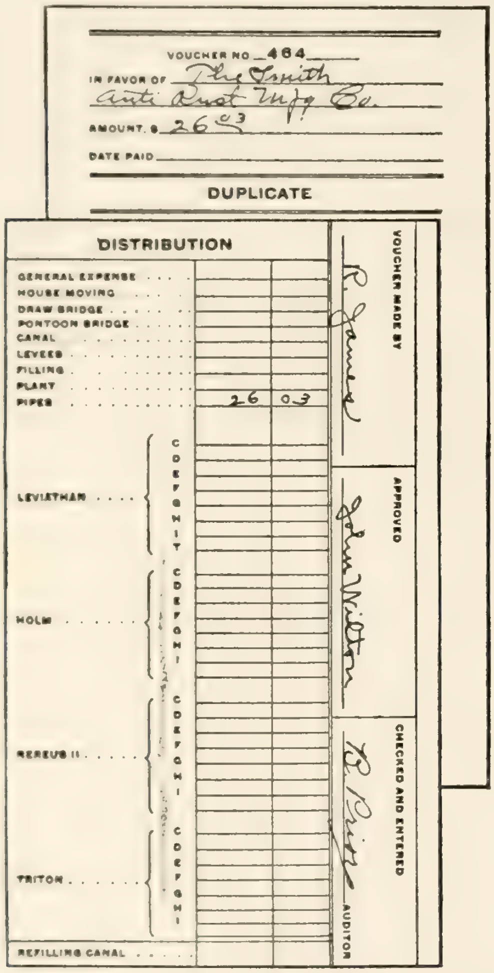
The contract order has given the utmost elasticity in purchasing. The machines must be kept digging dirt whatever else stops. The best result is that if a dredge or concrete plant breaks down, there is nothing to prevent the official in charge from getting his repair parts as fast as is physically possible. But almost equally important is the fact that this elasticity has been secured without paying the price of laxness. Just as soon as the superintendent of the works signs the confirmatory order, without which no voucher will be paid, the system gets its grip. It never lets go. Though the contract may be two thousand miles distant, the record of an unwise or an exorbitant purchase must come up against the parallel columns of the central office price comparisons.

The requisition and "Central Office Order," applicable to all large machinery units and such supplies as coal, oil, shovels and explosives, enables purchases in quantities, insuring rock bottom prices. It allows bargains or exceptional opportunities to be taken advantage of throughout the country. It enables the executive to gauge the buying policy of his superintendents or to check undue favors to a particular firm by calling for all the material orders that have been filled.

Since every order issued must be signed by the local superintendent on a requisition or order before starting on its cycle, no machinery will be ordered from the central office without knowledge of local conditions. For this reason, also, there can not be ordered from the central office, in error, or as the result of a salesman's cleverness, an undue quantity of supplies to be unloaded on the hapless contracts.

The accounting department can offer to the executive as the fulfillment of its function, that it has prevented any slip-up in footings, extensions or similar mathematical errors, by a rigid check on the contract figures.

By its counter checks on the contracts, payment on invoices for matters not actually delivered are quite prevented by the system. There would have to be collusion between the local superintendent, who signs the order, the local cashier, who verifies the receipt of the goods and of the invoice attesting both, and the local supply house. Next, all freight and express receipts are attached to the invoice sent to New York, thus giving the central office evidence of delivery. Thus the only error possible at the place of the contract would be emergency purchases at too high a price. Even this is under the constant supervision of the general manager and the purchasing department.



VOUCHER NO. 464

IN FAVOR OF The Smith Anti Rust Mfg Co.

AMOUNT, $ 26.03

DATE PAID

DUPLICATE

DISTRIBUTION

GENERAL EXPENSE			
HOUSE MOVING			
DRAW BRIDGE			
PONTOON BRIDGE			
CANAL			
LEVEES			
FILLING			
PLANT			
PIPES		26	03
LEVIATHAN	C		
	D		
	E		
	F		
	G		
	H		
	I		
	T		
HOLM	C		
	D		
	E		
	F		
	G		
	H		
	I		
NEREUS II	C		
	D		
	E		
	F		
	G		
	H		
	I		
TRITON	C		
	D		
	E		
	F		
	G		
	H		
	I		
REFILLING CANAL			

VOUCHER MADE BY R. James

APPROVED John Wilton

CHECKED AND ENTERED B. Price AUDITOR

Form 8—The voucher check used in payment of supplies purchased locally. It is countersigned by the contract superintendent and shows the destination of the purchase.

A final possibility of perversion in orders is what might be done in the New York office. But collusion between a clerk in the accounting room, a local cashier and a local supply merchant would be unlikely. The voucher check (Form 8) bearing on its face the materials ordered and all details of the transaction, forestalls any attempt on the part of the supply house to make false bills, which would, because of the voucher check record, have to be known by a man high up in the supply company.

There is, of course, always the possibility that orders may be swung to one firm or another. But the general manager's supervision gives a check against this, and, since every central office payment is made on a check signed by the president and the treasurer, as well as verified by the purchasing agent, this possibility is again discounted. Thus, a real control is given the contract executive over the infinite complexity of local and central office purchases. Restraints on contract purchases are provided, too, without loss of elasticity or efficiency in operation.

Ancient and Modern Water Works*

By Edward Wegmann, Consulting Engineer, New York City

FROM the remotest ages works were undertaken to obtain ample supplies of water for domestic purposes. In Egypt these works consisted in canals for irrigation and domestic supply. No ruins are found of aqueducts such as were built by the Romans. In Asia Minor water was sometimes conveyed in earthern or stone pipe to considerable distances. Jerusalem was partly supplied with water by a line of earthen pipe, about 10 in. in diameter. Remains of this old pipe line, which was probably constructed in Solomon's time (970 B.C.), are still to be seen. The city of Laodicea in Phrygia was supplied with water by an aqueduct about 5 miles long which was probably built about 260 B.C. The crossing of a deep valley on the line of this conduit was effected by an inverted siphon, consisting of two lines of 9-in. stone pipe.

Up to the end of the first century of the Christian era the Romans had built nine aqueducts. They have been described in great detail in a book written about 97 A.D., by Sextus Julius Frontinus, who was at that time "curator aquarum"—caretaker of the aqueducts—or, as we would say, Commissioner of Water Supply. Frontinus appears to have been a very conscientious official. On assuming his duties he made a careful examination of each of the nine aqueducts existing at his time, gauged the flow to the best of his knowledge and wrote their history. His book has been translated into English, French and German and is read with as much interest now as when it was written. Three additional aqueducts were built for Rome after the time of Frontinus.

Care in Selecting Source of Supply, and in Construction

The Romans were very particular about selecting good sources of supply, generally springs, for their aqueducts. As the only material they possessed for making water pipes, subjected to considerable head, was lead, which was expensive, they generally located their conduits so as to avoid crossing deep valleys. For the greater part their aqueducts were built in tunnels by the "fire-setting system," which consisted in heating the rock and then chilling it with water to crack the rock so that it could be removed by bars and wedges. The shafts were located usually about 240 ft. apart. When valleys had to be crossed arcades were built to carry the conduit at the proper level. A notable exception to this rule occurred in the aqueduct of Lyons, where two deep valleys were crossed by twelve lines of 12-in. lead siphon pipes encased in masonry.

No two of the aqueducts supplying Rome had the same cross section. This was probably done to make it easy to identify each aqueduct. The oldest aqueduct, the Appia, was 2.62 ft. wide by 5.23 ft. high. The largest conduit was the Anio Novus, which was 3.28 ft. wide by 8.86 ft. high.

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* From a paper read before the American Waterworks Association.

The early aqueducts were built entirely of dry-cut stone masonry with the exception of a concrete lining 4 to 6 in. thick. A cement of excellent quality was used in this lining. It was made of pottery pounded into small piecees and mixed with quicklime. For the later aqueducts rubble masonry or brick work was used. The bottom of the water channel was left very rough, probably to reduce the velocity of the current to aerate the water and to keep back sediment. About every half mile an angle was made in the line of the aqueduct. Some writers have thought that this was due to difficulties in securing the right of way, but others are of the opinion that these angles were introduced to retard the velocity of the current. The grades of Roman aqueducts in different parts of Europe vary from about 1:3000 to 1:6000. In some of these conduits the grades are quite regular while in others they vary considerably.

The aqueducts terminated in Rome in large public reservoirs, some of which received the water from several conduits. From the reservoirs the water was conveyed in lead pipes to private reservoirs. The quantity of the water drawn out of each reservoir was gauged by the size and number of the outlet pipes. The quantity of water that could be drawn to each domestic cistern was regulated by a short, bent tube of bronze, which was inserted in the side wall of the reservoir and formed the inlet to the service pipe.

The total quantity of water delivered daily to Rome in the time of Frontinus has been greatly exaggerated by certain writers, who made calculations based upon erroneous assumptions. In some encyclopaedias we read that this daily supply amounted to nearly 400,000,000 gal. Mr. Clemens Herschel has pointed out that the nine aqueducts existing in 97 A.D. did not deliver, in all probability, more than about 84,000,000 gal. per day. At the present time the city of Rome is supplied by four aqueducts, which deliver 100,130,000 gal. per 24 hours.

New York's Water-Works Greatest of Modern Times

The greatest water-works of modern times are, beyond question, those of the city of New York. Prior to 1774 the inhabitants of this city obtained the water required for domestic purposes from public wells. The first of these wells was sunk in 1658 in front of the old fort at Bowling Green. In 1774 the first public water works were constructed for New York according to plans prepared by Christopher Colles, an English civil engineer. The water was distributed through hollow logs.

In 1799 the Manhattan Company obtained a charter for supplying the city of New York with water from wells. The supply was insufficient in quantity and bad in quality.

In 1834 the Legislature of the State authorized the city of New York to obtain a supply of "pure and wholesome water" from the Croton River. The works necessary for securing this supply were constructed in 1837 to 1842. A "fountain reservoir" was formed by building a dam 50 ft. high across the Croton River, about 9 miles above its mouth. From this reservoir the water was conveyed to the city in a masonry conduit 8 ft. 5½ in. high and 7 ft. 5 in. wide. The Harlem River was crossed by a fine aqueduct bridge known as High Bridge, having fifteen semicircular arches. The water was received in a reservoir of 180,000,000 gal. capacity, built on land forming now part of Central Park, and then conveyed through three lines of 36-in. mains to a distributing reservoir on Murray Hill at Forty-second street and Fifth avenue, where it was let into the distributing mains.

The works described above were first put into service on July 4, 1842. For nearly 50 years they supplied the city, although they were severely strained to keep up with the increased consumption. According to the original plans, the Old Croton aqueduct, as the conduit above is now called, was only to deliver about 36,000,000 gal. per day. To keep up with the consumption this conduit was forced by 1880 to deliver about 95,000,000 gal, daily.

In 1880 to 1884 a small additional supply of 23,000,000 gal. per day was obtained from the Bronx and Byram rivers.

In 1884 to 1891 a second aqueduct, having a capacity of about 300,000,000 gal. per day, was built from the Croton Valley to the city of New York. This conduit, known as the New Croton aqueduct, is 13.53 ft. high and 13.6 ft. wide. The Harlem River was crossed by a siphon tunnel about 1300 ft. long, excavated about 300 ft. below tide. The new aqueduct was put into service in 1890. Its construction cost about $20,000,000.

The works which have been described are those of the former city of New York which forms since 1908 the Boroughs of Manhattan and The Bronx of the Greater New York. Each of the Boroughs of Brooklyn, Queens and Richmond has its own water-works The three aqueducts supplying Manhattan and The Bronx can deliver about 400,000,000 gals. per day. In case of a severe drought the Croton, Bronx and Byram rivers will not yield more, on an average, than about 300,000,000 gal. a day. As the two boroughs mentioned consume at present more than 300,000,000 gal. a day, it is evident that some new source of supply must soon be drawn on. This fact was realized in 1900.

In 1902 a commission of three expert engineers, Prof. William H. Burr, Rudolph Hering and John R. Freeman, was appointed to investigate all possible sources from which New York could obtain an additional supply of water. This commission recommended that a daily supply of 250,000,000 gal. be obtained from the streams in Dutchess County, immediately north of the Croton watershed, and that an additional supply of 250,000,000 gal. be derived from streams in the Catskill Mountains.

An Act passed by the Legislature prevented the city of New York from diverting any water from Dutchess County, and the city had, therefore, to go to the Catskill Mountains to obtain its supply.

The necessary works to secure a supply of 500,000,000 gal. per day have been in course of construction since 1905. The work when completed will consist of an aqueduct 17 ft. high by 17½ ft. wide, capable of delivering daily 500,000,000 gal. This water is to be distributed to all of the five boroughs of Greater New York.

The Catskill Aqueduct

The Catskill Aqueduct, as the new conduct is called, will consist of: Cut and cover aqueduct, 55 miles; grade tunnel, 14 miles; pressure tunnel, 17 miles; steel pipe siphon, 6 miles; total, 92 miles.

The aqueduct begins at the Ashokan Reservoir on Esopus Creek, which will have a storage capacity of

130,000,000,000 gal. and terminates at the city line, at the Hill View reservoir, which will store 900,000,000 gal. The Hudson River is crossed by a siphon tunnel 14 ft. in diameter, which was bored through solid rock about 1100 ft. below the surface of the river.

To provide for emergencies the Kensico Reservoir is being constructed on the Bronx River, 30 miles north of the City Hall. It will store 40,000,000,000 gal.

From the Hill View Reservoir the water will be distributed through circular pressure tunnels 11 to 15 ft. in diameter, which are to be excavated deep below the streets in solid rock. From two terminal shafts in Brooklyn steel and iron pipes will convey the water to the Boroughs of Queens and Richmond. The length of this distributing system is 34 miles.

The works now in course of construction will cost about $200,000,000. The supply from Esopus Creek will only average about 250,000,000 gal. per day. In the future additional reservoirs will be constructed to obtain another daily supply of 250,000,000 gal. from the creeks in the Catskill Mountains.

A Modern Office Building at Winnipeg

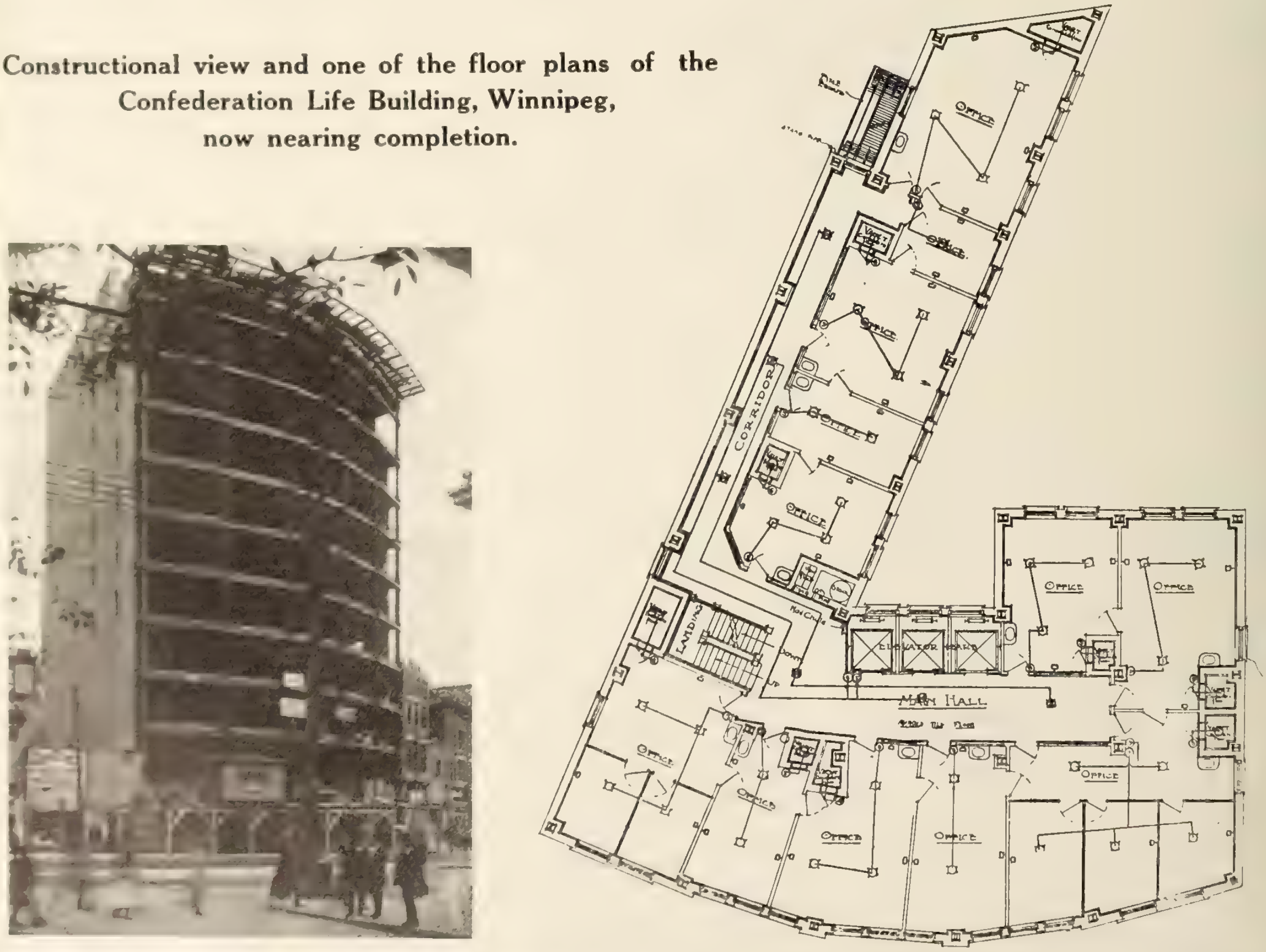
Features of Interest about the Confederation Life Building—Expeditious Manner of Erection—Heavy Design of Structural Steel

THERE are a number of features of interest about the Confederation Life Building at Winnipeg now under construction. In this structure, the owners have aimed at producing a high class, fire-proof, modern office building. A portion of the new building will be used by the company by whom it is being built as office premises, while the remainder will be rented.

The building will consist of eleven storeys, and basement. There will be a pent-house on the roof, to be used for a water-tank and storage purposes. The building is being erected of structural steel, with brick walls and terra cotta facings. The walls will be curtain walls, carried at each floor by spandrel beams.

The building itself might be said to be one of the very largest structures of its type in Western Canada. It is one of three of the largest office buildings in Winnipeg. In spite of its size, the work so far has been practically a record in construction in the west. The steel structural worki s now being completed, and the last of the tile floors will be placed during the next few days. The following data will give an

Constructional view and one of the floor plans of the Confederation Life Building, Winnipeg, now nearing completion.



idea as to the expedition with which the work has been carried on.

On January 3rd, the work of pulling down the old building which stood on the site, was commenced. On January 30th the excavations for the caissons commenced. On January 31st the first of the excavations reached full depth. On February 11th the thirty caissons upon which the building rests were completed. On February 15th the general excavations for the basement commenced. On March 2nd the work on the excavations was finished. On March 3rd the cast iron bases for the columns were laid. On March 4th the brick work in the basement was started. On March 20th the first steel work was erected. On March 23rd the rivetting commenced. On April 8th fire-proofing of the floors commenced. On May 4th the steel work had been erected at the front of the building to cornice level.

Heavy Design Throughout

The outstanding feature in connection with the building is the ponderous nature of the structure. It rests upon thirty caissons, some round and some square. The average depth to which these have been sunk is about 55 ft. The deepest is 58 ft. 6 in. The average size of the square ones is 3 ft. by 4 ft. The largest of the round caissons is 5 ft. 6 in. in diameter. The cast iron bases of the steel work rest on the concrete caissons. The building is designed to carry a much heavier load than is ordinarily the case with a building of this type. As will be seen in a later paragraph, the structural steel is of a very heavy design, and of immense strength.

The construction of the floors is rather out of the ordinary for this part of the country. It is built in 6 in. segmental arches, set in cement mortar. The walls are of 13 in. brick. The floors will be finished with a slab of concrete above the tiled arches, with maple flooring laid on the concrete. Marble will be used largely in the decorative details. The corridors will be finished in white marble, with the basis of mottled green marble. The floors in the corridors will be of tile. The whole effect of the decorations will be more than ordinarily attractive and rich.

One of the most interesting features in connection with the work was the erection of the steel. The speed and system with which this work was carried out and the manner in which the ponderous structure rose above the large buildings in the vicinity was a delight to the eye of the practised builder, as well as to the casual spectator.

The total weight of the steel is 860 tons; 265 tons of this quantity is used in the columns, the balance of 595 tons is in the beams. The design of the building—as may be seen from the accompanying drawing—made the designing of this portion of the work a most difficult and unusual task. The approximate height of the building above the street level is 150 feet, the highest point being the top of the roof of the pent-house. The front of the building is of an unusual shape, as it follows a bend in the street. The outside measurement of the front is approximately 97 feet 5 inches, and the extreme depth is 132 ft. 6 in.

The entire work in connection with the steel structure was carried out by the Winnipeg branch of the Dominion Bridge Company, Limited, of which Mr. G. E. Bell is manager. The plans were made at the Winnipeg draughting office. The work was fabricated at the company's Winnipeg works and was erected under the supervision of the company's engineer

The first step in connection with this portion of the work was the making of the steel diagrams, which were completed at once, so that the general contractor was enabled to order his terra cotta accurately and well ahead. The shop work was particularly rapid. The first detail went to the shop on February 1st, and the last of the shop-work was finished on May 1st. The erection of the steel was commenced on March 20th and was about finished on May 15th, which period included about 35 working days. This is a record for this line of work in Winnipeg. The steel work on the McArthur building was carried out with an expedition which compares favorably with the structure herein described, the time consumed being 56 days. The work on both buildings was done by the Dominion Bridge Company. The columns were all centred by the company's engineer and caused no trouble whatever, nor was there any accident of importance in connection with the work. The Dominion Bridge Company is taking a more and more prominent place in structural steel work in the west, and are this year carrying out some most important contracts.

The structural work is of the skeleton type, and it will be possible in case it is wished in the future, to make any change or addition to the building, to take out any portion of the brick or terra cotta without injuring or detracting from the stability of the whole structure. All the columns are of the Bethlehem structural types. The columns throughout are exceptionally heavy, some weighing as much as 253 pounds per foot. No. 18 and No. 19 are each 43 feet 8 inches long and weigh 4½ tons each. In order to provide for the greatest possible amount of head-room, 18 and 92 pound per foot floor girders, carrying the floor beams, were used.

An Expeditious Contract

In considering the time consumed in the erection of the building to the completion of the work on the steel structure, it will be judged with what great expedition the work was carried on. It must also be considered that the month following the beginning of operations was the coldest period of the year, the temperature varying from 40 degrees below zero to 20 degrees below. Following the first month, the weather was perhaps as favorable as usual for out-door work in Manitoba at that period of the year.

The distances between the floors are as follows: 13 feet, 3 inches from ground floor to first floor, and 11 feet, 3 inches from first floor to second floor. From that point to the top, the floors are each 10 feet, 3 inches above the floor beneath, inside measurement.

The general contractor for the work is the Carter-Halls-Aldinger Company, of Winnipeg. The architect is Mr. J. Wilson Gray, of Toronto. Messrs. Harkness & Oxley, of Toronto, were the consulting engineers. The fire-proofing materials for the floors were supplied by the National Fireproofing Company. The brick for the walls were supplied by the Alsip Brick and Tile Company. The building will be lighted by electricity, which is being installed by Mitchell & Grey. The terra-cotta was purchased of the Burmanofts branch of the Leeds Fireclay Company. Mr. R. E. Pickett is representing the general contractors on the work, and Mr. John Holden is representing the architect. It is stated that all the sub-contracts are let. The terms of the contract call for the completion of the building by January 3rd, 1913. The building will be equipped with two electric elevators. The water supply will be obtained from an artesian well sunk to a distance of 200 feet.

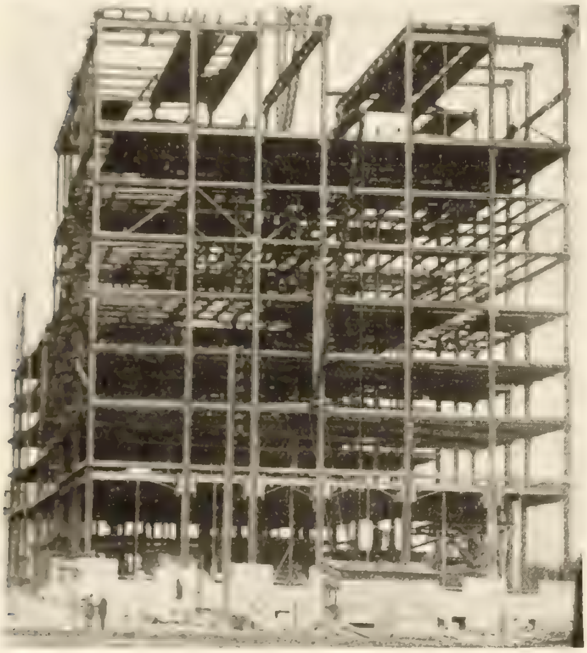
Winnipeg The Hub of the Building West

A City that is Undergoing Continuous Transformation—Facts and Figures about Current Constructional Development—The Supply Market

Special to the Contract Record

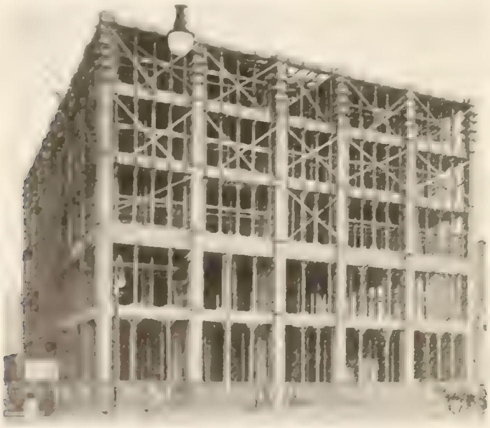
Winnipeg, June 19, 1912.

THE amount of building in progress in Winnipeg at the present time is probably greater than ever before in the history of the city. It includes all classes of work, large hotels, office buildings, apartment houses and a great number of dwelling houses of all sizes. Many of these latter are being erected at a cost ranging between $10,000 and $20,000, while the majority range between $3,000 and $6,000.



Fort Garry Hotel—Contractors: Geo. A. Fuller Company

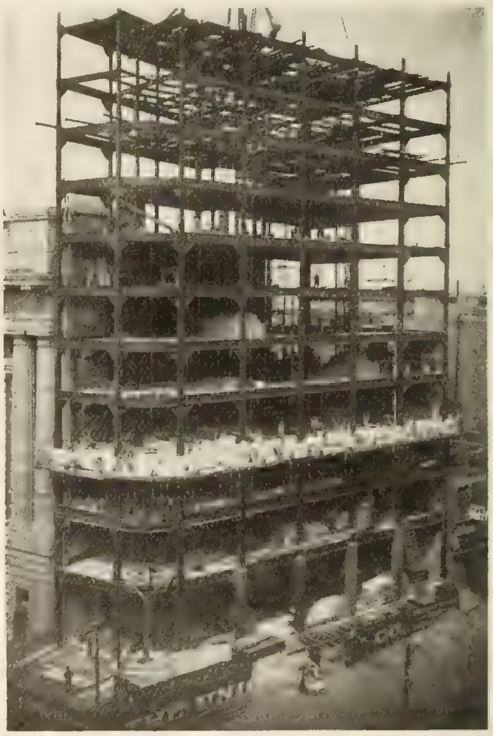
Only those people who have seen Winnipeg in the past few years can realize the great changes that have taken place in its principal streets. The eyesores of Main street which consisted of quite a number of dirty little frame buildings are quickly being replaced by magnificent structures. Not only are the buildings large, but good classical architecture is becoming quite a feature.



Boyd Building—National Construction Company

Dwelling houses are growing like mushrooms, on the vacant lots on the outskirts of the city. The construction of the cheaper class of dwelling house leaves much to be desired. An inspection of these buildings in course of erection shows very crude workmanship although when finished and painted they have quite a neat appearance. If the general inspection of the dwellings by the city officials were as strict as their inspection of the plumbing there would be a great improvement and the life of the houses would be considerably increased. It is estimated that the profit made from speculative house building is approximately one hundred per cent.

One of the accompanying illustrations shows the Fort Garry Hotel in the course of construction. This hotel is being built for the Grand Trunk Pacific Railway by the Geo. A. Fuller Company at an estimated cost of $1,500,000, and when completed will be one of the finest and most up-to-date hotels in Canada. The building will be fourteen storeys high and will contain three hundred and fifty rooms. It is of the structural steel type, the main uprights consisting of two channels rivetted to two plates. The excavation work was finished about the end of February and the illustration shows the work up to the present date. Messrs. Ross & McFarlane are the architects.



Union Trust Company's Building—Geo. A. Fuller Company

In another photo there is shown the new skyscraper in course of construction for the Union Trust Company. This is also a structural steel building and is situated on the north-east corner of Main and Lombard streets. The front of the building on Main street is comparatively small and the building widens as it extends east. This building rests on twenty-six concrete caissons, from three to six feet in diameter, which have a bed rock foundation at an average depth of sixty feet below the level of the pavement. About six feet of hard pan above the bed rock was encountered during the excavation work. The work of excavation and putting in the concrete footings was done by the Lyall Mitchell Company and Messrs. Geo. A. Fuller Company have the contract for the erection of the building. Mr. John D. Atchison is the architect.

An imposing structure is in course of erection on the east side of Main street for the Confederation Life Insurance Company. Messrs. Carter, Halls and Aldinger have the contract for the erection and Mr. J. Wilson Gray is the architect. The building is described in detail elsewhere

The Turner system of reinforced concrete construction is in evidence in this city. The Christie building, at the corner of Notre Dame avenue and Garry street, and the Boyd building, on the south-west corner of Portage avenue and Edmonton street, are both being built on this style of construction by the National Construction Company. With the decreased duty on cement there will probably be more reinforced concrete construction done than previously.

The Boyd building in the course of construction is also shown herewith. The spiral steel reinforcement is approximately twelve inches in diameter, with one inch steel rods laid longitudinally in the spiral.

The Christie Block, a nine-storey building, is about half erected.

An extensive addition to the recently completed Sterling Bank building is now in progress. It is an eight-storey building of structural steel, the bottom of the building being faced with terra cotta and the upper storeys with white brick. The Carter Halls Aldinger Company are doing this work and Messrs. James Chisholm & Son are the architects.

New Building Records

Winnipeg building records are made to be broken. In one week the contracts awarded aggregated in value $2,250,000. The biggest item in the list of new buildings to be erected is the new law courts, the tender for which has been awarded to the National Construction company at a figure of $760,000, though the complete cost of the building will be about $1,000,000. In the design of this building Provincial Architect V. W. Horwood has introduced all of the most modern features of buildings of this character. The exterior of its entire three storeys will be of Tyndall cut stone.

The street railway company have commenced the foundation of their new ten-storey office building, two floors of which they intend to occupy themselves, leasing the other eight floors. The first two storeys of this building will have a granite exterior, while the upper storeys will be of steel and terra cotta. It is fire-proof throughout and introduces several novel features in the design of office buildings in Winnipeg. Messrs. Pratt & Ross were the architects. The contract for this building went to Messrs. Carter, Halls & Aldinger, and it is to be completed by March 1, 1913.

The Belgo-Canadian Real Estate Company, a company whose headquarters are in Antwerp, but for whom Mr. W. J. Christie is managing director, are investing a large amount of money in Winnipeg and have commenced the erection of three 3-storey apartment blocks in Fort Rouge at a cost of over $400,000.

Owing to the unusually large demand for cement in the northern United States at the present time, the Lehigh Portland Cement Company, which has the contract for the supply of cement to the city of Winnipeg, has been unable to furnish the necessary amount, and the Board of Control

PRICES OF BUILDING MATERIALS AT WINNIPEG

(delivered on job)

Brick, kiln run, per thousand	$ 13.00
Brick, sewer, per thousand	14.00
Brick, chimney, per thousand	14.00
Brick, veneer, per thousand	15.00
Brick, pressed, per thousand	$25.00 to 50.00
Brick, enameled, per thousand	100.00
Blackboard Slate, per foot	.30
Building Paper, per roll	.75
Cement, per bbl.	2.50
Coal Chutes	18.00
Compo Board, per foot	.05
Crushed Stone, per yard	2.75
Drain Pipe (farm)	.05
Fire Brick, per thousand	15.00
Fire Clay, per ton	20.00
Fire Proofing, per thousand brick measure	18.00
Flue Lining, [illegible] per foot	.25
Gravel, per yard	1.85
Hardwall Plaster, per ton	12.50
Hair (plaster) per bale	1.25
Hair Insulator, per bale	8.25
Hollow Brick, per thousand	13.00
Hollow Blocks [illegible] per thousand brick measure	18.00
Hydrated Lime, per ton	12.00
Insulating Paper, per roll	1.25
Keene's Cement, per bag	2.00
Kelley Island Lime, per bbl. [illegible]	[illegible]
Lime, per bushel	[illegible]
Lath (metal)	15 to [illegible]
Lath (No. 1 pine)	5.75
Mortar Color, per lb.	.05
Menominee red sand mould brick, per thousand	25.00
Nails (wire), per keg	3.70
Nails (cut), per keg	3.70
Oriental Brick, per thousand	35.00
Paper (building) per roll	.75
Paper (tar), per roll	.90
Paper (sheathing), per 100 lbs.	4.25
Plaster, per ton	12.50
Plaster Board, per foot	.03
Plaster Bead, per foot	.05
Plaster of Paris, per bag	4.00
Roofing Felt (2 ply), per roll	2.50
Roofing Tile, per foot	.15
Rubble Stone, per cord	13.00
Sand, per cubic yard	1.75
Shingles (B.C. Cedar No. 1), per thousand	4.00
Shingles (B.C. Cedar No. 2), per thousand	3.50
Sewer Pipe, 4-inch, per foot	.08
Sewer Pipe, 6-inch, per foot	.16
Terra Cotta, superficial foot	1.50
Terra Cotta Facing Blocks, per foot	.25
Wall Coping, per lineal foot	.30
Wall Ties (metal), per thousand	6.00
Weeping Drain Tile, per foot	.05
Wood Fibre Plaster, per ton	12.50
Lead Pipe, per lb.	.06
Dry Colors:	
Red Lead, per 100 lb. kegs	6.50
White Lead, per 100 lbs	[illegible] to [illegible]
Gasoline, in barrels, per gal	.24
Boiled Linseed Oil, per gal.	[illegible]
Raw Linseed Oil, per gal.	[illegible]

has authorized the city engineer to order the necessary cement for the city works elsewhere. Under the contract with the Lehigh, the latter will have to make up the difference in price to the city, and it will be liable also for a penalty of $10 a day. The Lehigh Company shipped its first consignment of cement to the city in January, but though its mills have been working day and night recently, it has been unable to keep up with the demands.

Civic Expenditure Heavy

Large sums of money are being spent this year in the asphalt paving of the streets. Many of the residential streets are being paved with the number two construction, which consists of the binder and asphalt laid on a bed of broken stone, omitting the six inches of concrete used in the number one construction. Much work is also to be done this year in the extension of the high pressure water system for fire protection.

A great effort is being made by a special committee appointed by the city council to beautify the city. Trees are being planted and boulevards are being laid out in many streets. This work has been accelerated with a view to preparing the city for the Royal visit.

Labor Conditions Generally Satisfactory

The condition of the labor market in this city is very steady. Supply and demand seem to be approximately balanced. It is rumored that the bricklayers will ask for an advance above the present rate of 70 cents an hour when their present schedule is terminated. The sheet metal workers were to have gone out for fifty cents an hour on June 1st, but it is understood that they have compromised at 43½ cents. The electrical brotherhood have already asked an increase this month. Linemen are asking for an increase from 40 to 45 cents an hour and foremen linemen from 45 to 50 cents an hour.—L.R.M.

Canadian Railroad Development

A new firm of railway contractors at Moose Jaw, Sask., are Messrs. Marsch, Simes, Carey & Smith Company, Limited.

Preliminary plans of the yards adjacent to the waterfront have been prepared. The yards will be about one mile long and at the outset at least ten miles of tracks will be laid.

The Grand Trunk Railway Company have made plans for extending their yards at St. Lambert and Point St. Charles, with a view to relieving the serious congestion of traffic at Montreal.

Plans have been completed for the new C.P.R. building at Saskatoon. The new structure will entail an expenditure of considerably over $200,000. Provision is made for an additional three storeys.

It is stated that contracts have been awarded for the main wing of the new C.P.R. Hotel at Vancouver, B.C., which will cost upon completion some three millions. The building will ultimately be sixteen storeys high and contain [illegible]

The terminals for the new government road from Prince Albert to Fort Churchill are to be laid out under the supervision of Mr. H. T. Hazen, formerly Chief Engineer of the Duluth, Winnipeg & Pacific Railroad Company at Port Arthur, Ont.

Work on the excavation for the Grand Trunk Pacific Railway depot and yards at Prince Rupert has been temporarily suspended. Recently the provincial boiler inspector discovered that the boilers of the steam shovels engaged in the excavating work were defective, and would only permit to carry so small a head of steam that the machines could not be profitably worked. It is unlikely that new boilers can be obtained within a period of twelve weeks. The matter has been referred to Chief Engineer Kelliher.

Mr. F. D. Hazen, Dominion Government engineer, with a party of assistants, has left Winnipeg for Port Nelson, on the Hudson Bay, to commence work on the railroad terminal there. They expect to remain in the north about five years, according to a western despatch.

Mr. G. C. Van Dusen, who has a sub-contract on the Quebec Bridge, reports great difficulty in getting men. Last week he made a tour of St. Louis, Chicago, Cleveland and Detroit, with a view to securing five hundred workmen, but was unable to make up anything like a full complement.

The work on the rebuilding of the Lachine bridge by the C.P.R. is being pushed forward with all speed and the double-tracking is nearing completion. During the next month some important work will be accomplished in connection with this work which will greatly facilitate the completion.

Contracts for the second thirty miles of the Edmonton, Dunvegan and British Columbia Railway have been awarded by Duncan F. McArthur, who is in charge of this portion of the work on the new line to the Peace River. Mr. McArthur states that 60 miles of the grade will be ready for the track laying gangs within three months' time.

The C.N.R. are planning important extensions in the province of Ontario generally and in the district of Toronto particularly. The improvements to be made in the vicinity of Toronto will amount to several million dollars. New yards and shops will be erected at Leaside Junction and a new head office building in Toronto. Work on the shops will be commenced this summer.

The office of the chief engineer of the Canadian Northern Railway is engaged in the preparation of plans for the proposed railway repair shops and roundhouse to be erected this summer at Port Mann. The repair shops will be 200 feet long, and will be equipped with extensive machinery. They will adjoin the roundhouse which will have accommodation for fifteen locomotives. The material to be used in construction will probably be reinforced concrete.

In order to facilitate the shipment of men, equipment and supplies in connection with the construction of the section of the Pacific Great Eastern Railway between Pemberton Valley and Lillooet on the Fraser River, Messrs. Foley Welch & Stewart, railway contractors, who have entered into a contract with the provincial government to build the line from North Vancouver to Fort George, will utilize a portion of a route taken during the Cariboo gold mining days. They intend placing steamers on Harrison, Lillooet, Anderson and Seaton Lakes, as well as establishing a wagon transportation service on the connecting highways.

Tenders closed recently for an office building at Saskatoon for the C.P.R. The new block will be erected on Second avenue, and the work is to be rushed this summer. It will be four storeys high and built in the Renaissance style, with a cut-stone front up to the sills of the third floor, and above that faced with brick. The facing stone will be blue Bedford limestone, set off by four pillars thirty-two feet high, and, as the plans have been so drawn as to allow of an additional three storeys being added if necessary, a galvanized cornice will surmount the whole for the time being. The building will be strictly fireproof, with a steel frame, having its main entrance on the north side. The floors and stairs will be of marble while the upper storeys of the building will consist of suites of offices.

On behalf of the Canadian Northern Railway Mr. J. A. L. Waddell, C.E., who designed the plans, recently called for tenders for the construction of ten bridges along the line between Yale and Kamloops. The specifications sent to the leading bridge firms are contained in a book of 100 pages, of which fifty-six are drawings. The bridges will cost about $1,200,000.

The Canadian Northern Railway Company has acquired control of the Great Northern line between Port Kells and the railway bridge across the Fraser River at New Westminster, twelve miles from Vancouver. The arrangement will obviate the necessity of the Canadian Northern building a section of line eight miles long. Construction of the main line eastward was started at Port Kells, the question of building an independent line down to the railway bridge at New Westminster remaining in abeyance pending the result of negotiations with the Great Northern.

Contractors are pushing the work of construction on the main line of the Grand Trunk Pacific in British Columbia. For the first 96 miles west of Tete Jaune Cache there are gangs every one or two miles, each gang numbering one hundred hands. On this stretch alone there are upwards of 4,000 men employed in grading operations. At Tete Jaune Cache the last big job is a tunnel, and here the crews are working steadily day and night. It is expected that within a few weeks an extensive crew will commence operations on the road west of Fort George. Over two hundred laborers are leaving Vancouver weekly for the scene of construction work on the G.T.P.

An Announcement by the Canada Cement Company

At a meeting of the Directors of the Canada Cement Company, Limited, last Friday, the Board authorized the Secretary to make the following statement:

The question of the quantity of cement on hand and the difficulties of transportation were gone into.

The official figures show that on June 12th the Canada Cement Company had on hand 1,085,503 barrels of cement.

On the same date unfilled orders west of the Great Lakes amounted to 149,214½ barrels, of which quantity 60,707 barrels were in transit.

On the same date the company was short 300 cars and their deliveries at the head of the lakes by boat were 182,254 barrels less than the company had planned and was prepared to ship, this shortage being caused partly by the late opening of navigation, interruptions of the Cornwall Canal, the slow dispatch steamers have this year been receiving at the terminals and, by water, transportation companies not supplying a sufficient number of steamers.

Having in view the growth of the west and to assist the transportation companies, the board has authorized the building of four steamers for the company's use.

The consumption of cement in Canada for the year 1911 was 6,309,717 barrels. The capacity of the Canada Cement Company's present mills is 10,000,000 barrels per annum, which capacity is being increased as rapidly as the market needs.

Brick Shortage at Montreal

Owing to a combination of circumstances there is a shortage of brick, particularly of the common description, in the district of Montreal, and in the city itself some building operations are being delayed owing to this cause. At the beginning of the season the stocks were almost cleaned up, and now a big demand has arisen which has not been met in consequence of the manufacturers being unable to turn out bricks. The wet weather has materially interfered with their work and instead of builders getting new bricks at about the 1st of June it will be a month later before stocks will be on the market. The importations of brick from the United States, too, have been greatly hampered owing to the impossibility of getting sufficient cars and the inability of the railway companies to handle at the terminals the freight that has arrived.

Excellent progress has been made on the 9-storey building which is being erected on the corner of Portage avenue and Edmonton street, Winnipeg, for Mr. W. J. Boyd by the National Construction Company. The construction is the Turner reinforced concrete system. The building will be faced with terra cotta and will be ready for occupation by October 1.

From the Law Courts

No Common Law Liability.—An action by Catherine Darke to recover $10,000 damages under the Workmen's Compensation Act for the death of Hugh Darke, collapsed owing to the failure of the plaintiff to establish common law liability on the part of the defendants, the Canadian General Electric Company. Judgment was based upon the fact that deceased, at the time of the accident, was not acting under the superintendence of the company or under the order of his foreman.

City's Right to Close Street.—That a city has the right to close up a street during repairs, irrespective of any damage resulting therefrom to an individual, was the substance of a judgment rendered by Mr. Justice Greenshields, sitting in Montreal, in the case of H. Dupont vs. the City of Montreal. Mr. Dupont, a grocer, sued for $500, alleging that he had suffered to this extent in loss of business as a result of the fact that the entry to his store was blocked for some time by street repair work which necessitated the closing of the street. The court ruled that the city acted within its rights and dismissed the action.

Workmen's Privilege Claim.—Mr. Justice Beaudin, sitting in Montreal has given an important ruling to the effect that public highways cannot be seized for non-payment of wages of workmen employed in the construction of roads. The action was that of P. D. Derosiers, D. Dagenais, and Art. Meloche, employees of Henry Leedham, a contractor, who was entrusted with road building in the town of Beaconsfield. The contractor failed to pay the plaintiffs their wages for a certain period, and the latter forthwith registered a workmen's privilege, on the road itself, on the building of which they had been engaged. This they did, under the provisions of the code, which enact that, in construction work, any workman failing to receive wages due him for his services, has a right to enter a privilege against the completed work, this privilege becoming a species of lien or mortgage on the property until such time as it is paid off. The plaintiffs, therefore, asked that the public road be placed on sale to meet the claims entered, or that, failing this, the town, as proprietor of the road should meet the wage account out of the public treasury. Mr. Justice Beaudin, in summing up the evidence, ruled that the municipality could not give up the highway, as the latter was inalienable, as long as it maintained its character of property devoted to the use of the public. At any rate, it was not subject to the privilege described as the workmen's privilege in the code. On this point, His Lordship, who, in the course of the hearing had qualified the claim as a most unusual one, cited numerous references, all going to show that only [illegible] are not to be understood as falling under the designation of "construction" as the latter term is used in the article of the code dealing with the workmen's privilege.

Great Harbor Projects in Vancouver

Recommendations Contained in the Interim Report Submitted by Chief Engineer Lafleur Railroad and General News—The Supply Market

Office of the Contract Record,
Vancouver, June 19th, 1912

THERE is universal activity in the constructional field at Vancouver and district. Trade has advanced very rapidly of late, both in the city and up country and in all sections building and engineering developments are strongly in evidence. Satisfactory conditions prevail at the present time and there appears to be a long and prosperous season of activity ahead of those identified with construction. The leading supply firms report a decided increase in the demand for all lines, this being due in a measure to the stimulus of increased business from the interior.

Harbor Improvements

Harbor improvements in British Columbia are a live issue. Mr. Lafleur, chief engineer of the Public Works Department, has reported that the information at hand is not of a nature to allow him to submit at present a scheme of improvements which would adequately meet the requirements of Vancouver harbor, nor to arrive at anything like an approximate estimate of the costs of the work required. He advises a complete survey of the harbor up to, and including Burrard Inlet, and beyond the Second Narrows, False Creek and the North Arm of the Fraser River. This should not only include soundings and borings, but should also clearly show the extent of the foreshore owned or controlled by different railway companies, private corporations or individuals.

Mr. Lafleur states that after consulting with Mr. C. C. Worsfold, district engineer, New Westminster, he recommends the following work for the immediate needs of the harbor:

VANCOUVER CITY.—A pier or dock to be built at some point most suitable for shipping, after a careful survey, soundings and borings to be made to ascertain the best and most economical style of construction. This pier should be about 800 feet long and 250 feet wide, with at least 30 feet of water at low tide at the shore end, and have warehouses, trackage and full equipment for handling all kinds of merchandise.

NORTH VANCOUVER.—A similar pier or dock, the location being determined after a thorough survey and with a view to future railway connection.

NORTH ARM OF FRASER RIVER.—A complete survey from New Westminster to the Gulf of Georgia, through the Sandheads, to determine the best way to eventually maintain the channel with a minimum depth of 15 feet at low tide. This will need permanent retaining works on the sandheads and at certain retaining points on the river, dredging alone being likely to give only temporary relief.

FALSE CREEK.—A thorough survey with a view to improvement by dredging or building of docks or a dam at the outlet, or both combined,—meanwhile dredging to be continued so that vessels now using the channel can enter at all stages of the tide.

The first step towards the general improvement of False Creek is the relocation of the C.P.R. bridge, now used by the B. C. Electric Railway Company, this being, it is claimed, a menace to navigation, and an obstruction to fairway.

In rebuilding this bridge the drawspan should be at least as wide as that in the new Granville street bridge, and if possible the centre line should be at right angles to the channel, and the city should be ordered at once to remove the old Granville street bridge.

FIRST NARROWS.—Dredging should be prosecuted day and night until the widening is completed and the Porthier shoal removed. The waters of the Capilano should be diverted to the west channel to prevent the sand being washed into the dredged out channel.

$500,000 this Year

Mr. Lafleur describes this as an interim programme, the $500,000 available being ample for the fiscal year, as some time must be taken up for the preparation of plans and specifications. Mr. Lafleur has directed Mr. Worsfold to institute a complete survey of Vancouver harbor as outlined in his report to Mr. Monk.

Expenditure at New Westminster

The city council of New Westminster recently passed seven by-laws which aggregate $1,190,000. The largest single item on the by-laws is for harbor improvements, half a million dollars being described as a small sum to start with to make the beginnings in New Westminster of what is confidently expected to be one of the finest ports on the Pacific Coast. The other by-laws are as follows: street improvement $250,000; gas plant $225,000; hospital $100,000; waterworks extension $75,000; parks improvement $25,000; civic storehouse $15,000.

The contract let recently for the clearing of Deadman's Island in Coal Harbor, Vancouver, is termed the first active step in the preparation of the ground for development as a dockage centre in accordance with the plans of Messrs. Ludgate & Kinman, of the Island Dock & Warehouse Company. It is believed that the erection of these docks will cost approximately $3,500,000.

Bridge Construction

Negotiations are now being carried on by City Engineer Fellowes, Vancouver, for the consent of the B. C. Electric Railway Company, the Great Northern Railway Company, and the Brackman-Ker Milling Company to the location of footings for the Harris-Georgia street bridge on their property. At the western end of the bridge the footings are all in the C.P.R. yards, but at the eastern end they will have to be placed on ground owned by the other three companies mentioned. The City Engineer has already interviewed the Vancouver manager of the Brackman-Ker Milling Company with reference to placing two sets of footings in that company's building. The matter will be taken up at the firm's head office. The Great Northern engineers have already sent the city's request to Seattle for consideration. Mr. Fellowes interviewed Chief Engineer Conway, of the B. C. Electric Railway Company recently in the same connection.

A British Columbia deputation of influential business men waited upon Premier Borden recently regarding the construction of a bridge across Seymour Narrows from Vancouver Island to the mainland. The government will appoint a survey party of competent engineers to investigate and report the feasibility of the project. It is estimated that the bridge will cost $20,000,000 and the length will far exceed that of any bridge undertaken by the Dominion Government. Generous assistance it is understood will be given by the government of British Columbia.

Bridge Design—Co-operation Between Engineer and Architect

An earnest plea was recently made by Mr. G. R. G. Conway, chief engineer of the B. C. Electric Railway Company, in an address before the Vancouver Branch of the Canadian Society of Civil Engineers and the B. C. Society of Architects, for closer co-operation between engineers and architects in the designing of bridges. The plea was made at the close of an interesting address before the joint societies on the evolution of bridge building. The various features of the span, girder and arch type of bridge were fully explained, and in an interesting manner the speaker carried his audience from 600 B.C. to the present time in the realm of bridge building. The longest masonry span, the speaker said, is 295 feet, while in the great Williamsberg suspension bridge, over the East River, New York, the span of 1,600 feet is attained, and in the great bridge over the St. Lawrence at Quebec a span of 1,800 feet is proposed. The speaker made a lengthy reference to the famous London bridge, as well as to the bridge over the Forth, the latter being noted as probably the highest expression of engineering skill. The lecture was illustrated by nearly one hundred lantern slides showing famous bridges of all times and all countries. At the close of the meeting a hearty vote of thanks was given Mr. Conway for his interesting and instructive address.

Prices of Building Materials at Vancouver

(Delivered on Job)

Building Paper, No. 1, tarred, per roll	$ .62½
Building Paper, plain, per roll	.70
Bricks, common, per thousand	13.50
Bricks,pressed, per thousand	45.00
Cement, Portland, per bbl.	3.25
Fire Brick, per thousand	45.00
Lime, per bbl.	1.35
Sewer Pipe, per foot, 4-inch	.15
Plaster of Paris, per bbl.	4.25
Putty, per lb., bladders in 100 lb. cases	3.40
Hard Wall Plaster, per ton	15.00
Nails, wire, per keg	3.25
Nails, cut, per keg	4.25
Mixed Paint, per gallon	2.50
Boiled Linseed Oil, gall., in bbls.	1.25
Boiled Linseed Oil, per gallon	1.35
Hair Fibre, per ton	15.00
Fire Clay, per ton	15.00
Lath, No. 1, pine	2.75
B. C. Cedar Shingles, No. 1	2.10
B. C. Cedar Shingles, No. 2	2.00
Lead Pipe, per lb.	.07
Dry Colors:—	
White Lead, per lb.	.07
Red Lead, per 100 lb. kegs	6.00
White Lead, per 100 lbs. in oil	8.50
Gasoline, in barrels, per gallon	.30

Stone Cutters' Dispute

A deputation from the Stone-Cutters' Union of Vancouver waited upon the Attorney-General recently to discuss the difficulty which has arisen between the Stone-Cutters' Union and the Granite Cutters' Union in connection with the addition to the Vancouver courthouse. As explained by the deputation, the stone-cutters demand that the granite cutters shall confine themselves to their proper business of cutting granite, or else shall join the Stone Cutters' Union and pay the initiation fee of $10 per head. This the granite cutters have thus far refused to do.

Granite cutters have the advantage in that they are able to handle not only granite, but other kinds of stone as well, while the stone-cutters are not able to handle granite. The courthouse is being built of Haddington Island stone, which is of such a character that it can be handled by members of either union. The stonecutters say that the cutting of it belongs to them, while the granite cutters say otherwise.

The Attorney-General, after listening to both explanations, promised to confer with the contractor and arrange some compromise. Meantime the stonecutters on the court house have ceased operations and the granite cutters are going on with the job. The dispute affects not only the Vancouver courthouse but also the additions to the legislative buildings at Victoria. This addition is also of Haddington Island stone, and is a much larger contract than the courthouse. Unless a satisfactory conclusion is reached in Vancouver, the contractors here will have trouble when the time comes to begin work.

Personal Mention

Mr. C. A. Johnson is starting up in business at Wetaskiwin as a builder and contractor.

Messrs. F. T. Myers and F. S. Turner, contractors, of Fort Frances, have gone into partnership.

Mr. J. A. Harvey, architect, Toronto, has removed his offices from Manning Chambers to 164 Bay street.

Mr. E. R. Conlan, architect, Toronto, has removed from 155 Queen street west to 802 Lumsden building.

It was announced recently that Mr. F. P. Jones, of the Canada Cement Company, would leave for the west to complete plans for a new million-dollar cement plant at Medicine Hat, Alta.

Mr. L. Thomas has organized the new firm of Messrs. Thomas & Company, consulting engineers, architects and financial agents, Moose Jaw, Sask. Mr. Thomas was formerly resident engineer for the C.N.R. at Moose Jaw.

Mr. John MacDonald, formerly a member of the engineering staff of the city of Medicine Hat, has been appointed district engineer for Medicine Hat and Milk River, by the provincial government of Alberta.

Mr. John A. Wilson, Vancouver, recently received the appointment of City Engineer of Kamloops, B.C., at a salary of $2,500 per annum. Mr. Wilson and Mr. R. S. Lea, of Montreal, are at present engaged upon a general scheme of grading and sewerage for the city of Kamloops.

Mr. H. G. Burd, who for some time has been connected with the Standard Underground Cable Company as sales engineer in the New York office, has been appointed assistant to the sales manager of the Standard Underground Cable Company of Canada, Ltd., with headquarters at Hamilton, Ont.

Prof. A. H. Blanchard, of Columbia University, who is well known as a contributor to this journal, has been retained by the Board of Water Supply of New York City as consulting highway engineer. The Board's work involves the rebuilding and relocation of a number of roads near the aqueduct line and the reservoir sites.

Mr. William H. Marsh, who for the past ten years has been connected with the Standard Underground Cable Company of Pittsburgh, Pa., in the capacity of Superintendent of Construction, has been appointed Secretary and Assistant Treasurer and Sales Manager of the Standard Underground Cable Co., of Canada, Ltd., with headquarters at Hamilton, Ont.

Mr. William P. Fitzsimmons, Commissioner of Indusffice for the Grand Trunk Railway System, who is accompanying the British manufacturers now touring Canada, announces that an iron plant, with $2,000,000 capital, headed by Mr. Frank B. Baird, president of the Buffalo Union Furnace Company, and to be known as the Canadian Union Furnace Company, is to be established at Port Colborne, Ont.

Mr. F. Welch, of Messrs. Foley, Welch & Stewart, railway contractors, recently journeyed north to Hazelton to inspect the progress of construction on the western section of the Grand Trunk Pacific. On his return to Vancouver, Mr. Welch will go over the route of the Pacific Great Eastern between North Vancouver and Lillooet, where two surveying parties are now engaged locating the line.

Messrs. Gladman & Gladman, architects, have opened an office at 2 Toronto street, Toronto. The members are C. R. A. Gladman and V. L. Gladman, both former residents of Lindsay, Ont. The former is a graduate of the School of Architecture of Harvard University, while Mr. V. L. Gladman is a graduate of the School of Architecture and Engineering, McGill University, and until recently was with Carrere & Hastings, of New York.

Mr. E. Wilson, a partner in the well known British engineering firm of Coode, Son & Matthews and one of the leading authorities on harbors and docks, arrived in Monttreal last week and made a tour of the harbor works at the invitation of the Commissioners. Among those who accompanied Mr. Wilson on his inspection were Mr. F. W. Cowie, Chief Engineer of the Harbor, and the three Harbor Commissioners, Major G. W. Stephens, Mr. C. C. Ballantyne and Mr. L. A. Geoffrion.

The announcement that Mr. C. B. Hull, of Ottawa, has been appointed public works resident engineer at Prince Rupert is of great importance to that city. Formerly a resident engineer of the public works department was located at New Westminster, his sphere of operations including the whole coast north of Vancouver. Mr. Hull's appointment will make Prince Rupert the centre from which will be transacted all the business in connection with his department on the northern coast.

The death of Mr. E. H. Keating, at one time City Engineer of Toronto, later General Manager of the Toronto Railway Company, and subsequently a member of the consulting engineering firm of Keating & Breitheupt, came as a distinct loss to his many friends, despite the fact that for some time he had been in failing health. The late Mr. Keating was a member of the council of the Institute of Civil Engineers (British) and was also a member of both the Canadian and American Societies of Civil Engineers. He was a past president of the Canadian Society.

Important changes in the personnel of the City Engineer's department at Victoria, B.C., have been made by City Engineer Rust. Mr. H. Worswick, who, for the past fourteen months has been superintendent of construction in full charge of all outside work, has resigned. Mr. A. E. Foreman, recently inspector of the Dalas road sea wall work and at present in charge of the work of repair at Smith's Hill reservoir, Victoria, will be appointed chief assistant to Mr. Rust, and will have charge of the outside work, as well as departmental work. The engineering knowledge possessed by Mr. Foreman will be most valuable in the supervision of the many civic works now under way or projected. It is probable that further changes will be made by the appointment of engineers to supervise individual works.

The Fifth Annual General Assembly of the Royal Architectural Institute of Canada will be held at Ottawa, in the Public Library, on Monday, October 7, 1912, when the present Council of the Royal Institute will transfer all the assets and affairs of the Institute to a new Council composed of delegates of the various associations of architects of the Dominion, in accordance with the conditions of the new Charter of the R.A.I.C. sanctioned by Parliament on 1st April, 1912. This will complete the federation of all the architectural bodies in this country, at which the promoters of the Institute have been aiming since the formation of that society in 1907.

Constructional News and Notes

Messrs. Fred. Walker & Company are a newly organized firm of contractors at Regina, Sask.

The capital stock of The Bitulithic & Contracting Company, Winnipeg, has been increased from $200,000 to $400,000.

At Red Deer, Alta., operations have been commenced at the new plant of Cement Builders. Mr. H. D. Murrin is the manager.

Among the newly registered contracting firms at Montreal are Messrs. Laflamme & Bedford, and Messrs. Tousaint & Company.

The Prince Albert Supply Company, Prince Albert, Sask., are taking over the supply business formerly conducted by Mr. F. A. Ross.

Messrs. Wm. Dunford & Son, Limited, are a new architectural firm incorporated in British Columbia with head office at Victoria and a capital of $50,000.

The ratepayers of the parish of Farnham. P.Q., have refused by a majority of 14, to authorize a loan of $75,000 for improvements to roads, under the scheme of the Gouin Government.

An eight-storey block is to be erected at Regina this season by Messrs. Callum Hill & Company. The plans are now being prepared by the architects, Messrs. Storey & Van Egmond.

The Great West Manufacturing Company will erect a plant in Calgary, Alta., and will produce a line of heavy machinery for well drilling, scrapers for road construction, and other implements.

Red Deer, Alta., reports a busy building season with over 100 dwellings and 30 business buildings under way or completed. The estimated value of the work now in progress is $500,000.

Among the new Winnipeg concerns we note the following: Henry Heg & Son, contractors; M. Meyerson, contractor; Allan & Grant, stone-cutters; Northern Sand & Gravel Company; Western Marble & Mosaic Company.

The Ingersoll Engineering & Constructing Company has secured articles of incorporation in the province of British Columbia. Their office is at 708 Dominion Trust Building, Vancouver. The company's head office is at Pittsburg.

The Town Council of Kindersley, Sask., have decided to install a system of waterworks and electric light to cost about $100,000. The source of water supply will be from a dam to be constructed about a mile to the south of the town. Tenders will be called for immediately. The John Galt Engineering Company have been appointed engineers.

Newport, at the head of Howe Sound, about thirty miles from Vancouver, will be an important base of operations during the building of the road as far as the Green Lake Summit. This is a formidable undertaking owing to the heavy character of the work, which will likely occupy two years. It will be an important point for the distribution of men, material and supplies.

The "Made-in-Canada" train which is running along the western lines of the C.P.R. reached Calgary the other day and all previous attendance records have been broken. The train was so popular during a stay of fifteen hours in the prairie city that visitors were always found crowding hundreds deep with four C.P.R. policemen to keep them in order. So great was the crowd that it was impossible to get within fifty feet of the train. All along the line, beside the train, the crowd struggled for admission, and in the train itself a long line passed from car to car. Men, women and children scrambled for places leading to the gangway. During the stay in Calgary over twenty thousand visited the train, beating the record at Winnipeg by one thousand.

Messrs. Keith & Fitzsimons, Toronto, made a mistake of $4,000 on the short side in their tender on the heating and ventilation plant for the new Clinton Street school. The Property Committee of the Board of Education consented to the withdrawal of the tender, and awarded the contract to the next lowest tenderer, the Fred Armstrong Company, at $14,563, which was $4,000 higher than that of Keith & Fitzsimons.

At Brandon, Man., the Maple Leaf Company have decided to replace their elevator recently destroyed by fire, by one of even greater capacity. The space between the new structure and the mill building will be occupied by concrete storage tanks with a capacity of probably 150,000 bushels. That, with the capacity of the new elevator, will bring the total storage capacity up to a quarter of a million. Work has already been started and the contract calls for completion on or before Aug. 15.

Plans have been completed for the new Custom House in Montreal designed to accommodate the whole service in the city. Tenders will be called for immediately. The proposed structure will have a frontage of 460 feet, a depth of 131 feet and a height of eight storeys. The section to be built this summer is the examining warehouse. The construction will be of stone. The plans are from the office of Mr. David Ewart, Dominion Government Architect, Ottawa.

Messrs. Ross & Macfarlane, architects, of Montreal, have been awarded the first prize in the competition of plans for the new $1,000,000 Central Technical School of Toronto. The prize is the commission for designing and superintending the erection of the proposed building. Messrs. David R. Brown and Hugh Vallance, of Montreal, obtained the second prize of $800, and the third prize of $500 goes to Mr. Charles S. Cobb, 2427 Queen street east, Toronto. Seventeen designs in all were submitted.

The New Brunswick legislature at its last session passed a town planning act which will enable all the cities and towns in the province to provide for expansion along right lines. A Town Planning Commission will shortly be formed in St. John. Two members of the city government attended the convention of the National Town Planning Association in Boston, and on their return stated that they felt that a commission should be formed in St. John at once. The city is growing east, west and north, and it is important that a proper plan of expansion be now adopted.

The city of Quebec has an important industrial acquisition in the newly organized Citadel Brick & Paving Block Company, Limited. This company, which is capitalized at $700,000, has obtained a comprehensive charter from the Provincial Government and will manufacture high grade brick, paving block, fireproofing, drain pipe, etc. It has acquired extensive property near Montmorency Falls, having a frontage on the St. Lawrence River of more than 1,800 feet. With the main line of the Quebec Railway Light, Heat & Power Company running through the property, the company has excellent transportation facilities in regard both to water and rail. There is available a practically unlimited quantity of high grade grey shale which has been reported upon favorably by English, U. S. and German testing laboratories. The superintendent of the plant is Mr. Otto Pommer, a brickmaker of wide practical experience in the United States and Germany. The treasurer and general manager is Mr. F. C. Thorn and the company's office is located in the Auditorium Building at Quebec. It is of interest to note that one of the leading organizers of this new company was Mr. Arthur Laurent, president of the Canadian Fireproofing Company.

According to a dispatch from Winnipeg the removal of half the duty on American cement does not seem likely to benefit contractors as much as has been hoped. Several American cement concerns have notified Winnipeg people of a raise in prices, saying they are no longer able to supply them on the old prices. Other firms in the West have received similar notifications, and the raise seems to have been made to very nearly correspond with the removal of the duty. There will be a saving to Winnipeg contractors who have ordered a supply, as by the terms of such contracts they obtain the benefit of all cuts in duty. One Winnipeg firm, which uses a considerable quantity of cement, wired five firms in the States for quotations, and prices quoted in reply were, in four cases, greater than quotations from Canadian concerns. The fifth was five cents a barrel less, but this was offset by the return of the sacks. Another which has enough for probably the entire season already contracted for, has been notified that no further orders will be taken at the old price.

Navigation Congress Delegates in Montreal

About 140 of the delegates, including many distinguished European engineers, who have been attending the International Congress on Navigation at Philadelphia have been on a visit to Montreal, where they were the guests of the Harbor Commissioners and the Canadian Society of Civil Engineers. On their departure from Prescott, the party were in charge of Lieut.-Col. W. P. Anderson, chief engineer of the Marine and Fisheries Department, and Prof. C. H. McLeod, secretary of the Canadian Society of Civil Engineers, and upon the arrival of the boat in Montreal the delegates were met by Mr. F. W. Cowie, chief engineer of the port, and a committee from the Society of Civil Engineers. The next morning, the party, together with two of the Panama Canal engineers, Messrs. Schoelhorn and Post, inspected the harbor on board the "Sir Hugh Allan," and were the guests of the Canadian Society of Civil Engineers in the afternoon. In the evening the Harbor Commissioners entertained the delegates at dinner. The party also visited Quebec.

Publications Received

The June number of "Chain Belt," the up-to-date little publication which issues from the office of the Chain Belt Company, manufacturers of elevating, conveying and concrete machinery, Milwaukee, Wis., is up to its usual standard. An article of interest in this number is one relating to a new field for concrete in the construction of coal breakers and washeries.

A complete directory of the plumbing, heating, lighting, power plant and mill supply industries in the United States has been published by the Crawford Publishing Company, 537 South Dearborn street, Chicago, Ill. This book, which has been compiled with the greatest care and which is a model in its arrangement and detail, contains a list of wholesale dealers in plumbing, heating and lighting supplies which will be found invaluable to the manufacturer. The list of jobbers and dealers in mill, steam, mine and railway supplies, tools and machinery, is of inestimable value as a daily reference and mailing list. Much useful information pertaining to the Canadian field is given. The price is $5 net.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

County of Wentforth, Ont.

Roads. Reeve, Geo. Miller, Hamilton. County Clerk, Jos. Jardine, Hamilton. $2,000 has been appropriated for new roads and road repairs. Road machinery may be required.

Chatham, Ont.

Sidewalks. The council have decided to lay sidewalks on several streets. Tenders will be called at once.

Estevan, Sask.

Waterworks and sewerage disposal. Engineers, Chipman & Power, Toronto and Winnipeg. Tenders received by secretary-treasurer, L. A. Duncan, until July 9th, for the following: Contract "A"—Water Works Force Main. Contract "B"—Water Works Pump House. Contract "D"—Water Pipes. Contract "G"—Pumping Machinery. Contract "I"—Pump Well. Contract "O"—Outfall Sewer. Contract "X"—Sewage Disposal Works. Plans at Estevan and Engineers office.

Peterborough, Ont.

Sewage Disposal Works. Chairman of Board of Works, Wm. Buller, 162 Charlotte street. Engineer, T. A. S. Hay, City Hall. The Board are investigating the various systems but are not yet decided.

Smith's Falls, Ont.

Tenders received by the Clerk, Jas. A. Lewis, until July 2nd for 40,000 sq. ft. of sidewalks. Plans at office of S. B. Code, Town Engineer.

St. Thomas, Ont.

Sewer to cost $6,800. 24-in. vitrified tile to be used on level; 18-in. vitrified tile on hill side, also screen to be put in septic tank. Specifications at office of engineer, Mr. M. H. Baker. Tenders received by him.

Paving. (Gladstone avenue and Ross street). Engineer, Mason H. Baker, St. Thomas. The City Council have been petitioned by ratepayers to build Tarvia pavement.

Toronto, Ont.

Sewers. Sealed tenders addressed to His Worship Mayor Geary, Chairman of Board of Control, will be received until July 3rd for the construction of the following pipe sewers: Bermount avenue, Langley avenue, Pendrith street, Jackman avenue, Selkirk avenue, Greenlaw ave., St. Clarens ave. Plans from the City Engineer's office, City Hall.

Watrous, Sask.

Concrete walks. Mayor, R. B. Davidson. Engineers, Chipman & Power, 106 Bay street, Toronto. Sealed tenders received by Sec.-treas., Jos. Gaye, until July 15th. Plans at office of sec. and engineers, at Winnipeg and Toronto.

Watford, Ont.

Granolithic walks. Tenders received by Clerk, W. S. Fuller, until July 1st. Plans may be obtained at his office.

Township of Barton, Ont.

Cement walks. Tenders received by Clerk, Alfred G. Bryant, c/o Reeve, Mr. Gallagher, 16 James street, Hamilton, until June 27th. Plans at office of E. G. Barrow, John street, Hamilton.

Winnipeg, Man.

Paving, for Rural Municipality of Ft. Garry. Tenders received by Clerk, Chas. J. Drake, until June 27th. Plans at office of Engineer, D. R. Baribault, 607 Exchange Bldg.

Waterworks supplies. Tenders received by Board of Control until July 15th for 12-in. c.i. pipe, valves, hydrants, etc. for fire service water works high pressure. Plans at office of engineer, Mr. H. N. Ruttan, 223 James avenue.

Winona, Ont.

Pumping unit for E. W. Smith. Plans at office of Engineers, Smith Kerry & Chace, Confederation Life Bldg., Toronto who will receive tenders.

CONTRACTS AWARDED

Berlin, Ont.

Addition to waterworks to cost $15,450. One million gallon concrete reservoir. Engineers, Bowman & Connor, 56 Toronto street, Toronto. General contractor, Joseph Patterson, St. Marys. Work to start soon.

Red Deer, Alta.

Cement sidewalks to cost $33,600. Engineers, Dawe & Seymour. Sec.-treas., A. T. Stephenson. General contractor, Forest City Paving Co., Lethbridge, Alta.

Thorold, Ont.

Paving. Contract awarded to "Westrumite" Brantford, Ont., for paving Front street with Bessemer brick. Contract awarded to Rocmac Roadway Corporation, Thorold, for paving 2175 sq. yards roadway with "Rocmac."

Toronto, Ont.

Sewers. Contracts have been awarded to the following: M. H. Murphy, 29 Jarvis street (Murial Ave., Gertrude Pl.). J. F. Connolly, 606 Avenue Road (Dupont, Bloor street). J. H. McKnight, 152 Bay street (Hain and Oakwood avenue).

Winnipeg, Man.

Water mains. Engineer, Mr. H. N. Ruttan, 223 James avenue. The contract for high pressure water mains on a large number of streets was awarded to J. W. Astley, Engineer of Construction, City Yards, for $19,686.45.

Railroads, Bridges and Wharves

Arthur, Ont.

Bridge—reinforced concrete girder. Plans at office of engineers, Bowman & Connor, 36 Toronto street, Toronto. Tenders received by M. D. Brocklebank, Arthur, Ont., until June 28th.

Bridge. Engineer. Mr. Lavoie. The Board of Control are considering the building of a bridge from the city to St. Helen's Island.

County of Wellington, Ont.

Bridges. Tenders called after June 29th for the construction of a 70-ft. steel arch bridge with concrete abutments; also a flat top bridge. Plans at offices of the Clerk, Charles McNales, Rockwood, Ont., and engineers, Bowman & Connor, 36 Toronto street, Toronto.

Leeds, Que.

Wooden bridge over Palmer River. Sec.-treas., William Hume, Leeds, Que. All lumber and iron work in old bridge of any use may be used in new one and will be given to contractor free by corporation. Tenders for open or covered structure will be received by Sec.-treas. until noon, June 28th. Plans at office of council.

Port Arthur, Ont.

The Drydock & Shipping Co. intend constructing the following buildings this season: power house, 50 x 105, warehouse 60 x 120, joiner shop 60 x 160.

Prince Albert, Sask.

Canal. The city is contemplating having a 40-ft. canal constructed at Lacolle Falls on Saskatchewan River for the development of 15,000 h.p. Mr. Morton is Mayor.

Quebec, Que.

Dry Docks for Dominion Government proposed. Mr. Morris and F. G. Wilson will act for the government in the selection of a suitable site.

Red Deer, Alta.

Bridge to cost $5,500, Gaety avenue S. Architect, Dawe & Seymour. Sec.-treas., A. T. Stephenson. Plans ready. Work to be done by day labor.

Rockwood, Ont.

Bridges for Co. of Wellington. Sealed tenders received until June 29th by W. J. Sutton, Court House, Guelph, for the construction of (a) 70 ft. x 18 ft. steel bridge at Rockwood; (b) concrete abutment for same; (c) reinforced girder bridges near Elora. Plans, etc., at office of Engineers Bowman & Connor, 36 Toronto street, Toronto.

Sydney, N.S.

Docks, etc., cost $6,000,000, for British Canadian Ship Building Company. Secretary, A. C. Ross; City Clerk, Jas. J. Curry. The citizens of Sydney have voted to grant a bonus to the above company who propose building docks and a shipbuilding plant.

St. George, N.B.
Dredging. Tenders received by Sec. R. C. Desrochers, Ottawa, Ont., until July 2nd. Specifications at his office.

St. Gerard de Majella, Que.
Concrete abutments. Tenders received by Sec.-treas., Narisse Clermont, until July 6th for the construction of two concrete abutments for iron bridge on the River L'Assomption. Plans at offices of M. Council and Sec.-treas.

Sarnia, Ont.
Car barn to cost $10,000, for Sarnia Street Railway Co. Manager, H. W. Mills, Sarnia. 1-sty., 88 x 160, brick. Plans prepared; will build by day labor.

Township of Erin, Ont.
3 bridges. Tenders will be called after June 30th for 3 concrete girder bridges. Plans at office of Engineers, Bowman & Connor, 36 Toronto street, Toronto, or Clerk, Peter McLaren, Ospringe, Ont.

Toronto, Ont.
Channel work. The Harbor Commissioners are contemplating expending $5,000,000 for improving Ashbridges Bay district, the work to include cutting a channel 300 feet and 24 feet deep.

Township of Maryboro, Ont.
Bridge. Engineers, Bowman & Connor, 36 Toronto street, Toronto. Tenders received by Clerk, W. W. Scott, Moorefield, Ont., until July 4th for the construction of a 110-ft. span steel bridge over the Connestogo River, also concrete abutments. Plans at office of engineers. Bowman & Connor, 36 Toronto street, Toronto, and clerk.

Vancouver, B.C.
Ten bridges for Canadian Pacific Railway on section of railway between Port Man and Yellow Head Pass over Fraser, Thompson and North Thompson Rivers. Plans at office of Consulting Engineer. Tenders received by Mackenzie, Mann & Co., Ltd., Metropolitan Bldg., Vancouver, until noon, July 8th. Consulting Engineers, Waddell & Harrington, Winch Bldg., Vancouver. B.C.

Welland, Ont.
Railway supplies for Niagara, Welland & Lake Erie Railway Co. President, C. J. Laughlin, Welland. Tenders for the following: 5,000 Standard No. 1 cedar or tamarac ties; large quantity of 30-ft. cedar poles, overhead wiring, etc., for railway extensions.

Windsor, N.S.
Bridge about a half mile long across the Avon River. Engineer in charge, Blair Ripley, Kemptville, N.S. Tenders open.

CONTRACTS AWARDED

Blair, Ont. (County of Waterloo)
Bridge. Engineers, Bowman & Connor, 36 Toronto street, Toronto. Contract awarded to Hamilton Bridge Wks. for addition to bridge over Grand River at Blair, Ont.

Calgary, Alta.
Railway 175 miles, Swallwell to Calgary, for Grand Trunk Pacific Railway. General contractor, Geo. H. Webster, G. T.R. contractor. Work has started in above section. The depot and hotel in connection with the railway will be started at once.

Kingsville, Ont.
Dredging. The Dominion Government have awarded contract for 81.000 cu. yds. for $14,650 to W. E. Hardison, of Welland, Ont.

Oakville, Ont.
High level bridge, across Sixteen Mile Creek, for County of Halton. Clerk, Wm. Panton. The Council has awarded contract to A. J. Gibson of Oakville.

Souris, P.E.I.
Dredging. Dominion Government have awarded contract for 100,000 cu. yards in Vernon River to the Island Dredging & Construction Co. Ltd., of Souris, P.E. I., for $24,000.

Sturgeon Point, Ont.
Wharf and boat house for Mr. Mathews. General contractor, Jno. Dickson. The boat house will have living apartments above it.

Twp. of Tiny, Ont. (County of Simcoe)
Bridge and combined bridge and mill dam. Engineer, Frank Barber, 57 Adelaide street E., Toronto. Bridge, A. A. McDougall. Mildmay, Ont. Combined bridge and mill dam, J. J. Dumond, Brentwood, Ont.

Toronto, Ont.
Dredging, cost $26,250. Contract for 150.000 cu. yds. in Toronto Harbor has been awarded to Messrs. R. Weddell & Co., Trenton, Ont.

Freight terminal to cost $75,000, Simcoe, Wellington and John streets, for Canadian Pacific Railway. Architect, Hutcheson, Wood & Miller, Royal Ins. Bldg., Montreal. General contractor, P. Lyall & Son, Ltd., 60 Mutual street, Toronto. Supt. of construction, F. L. Ellingswood, 485 St. Catherine street west, Montreal, or site of work.

Vancouver, B.C.
Depot for Canadian Pacific Railway Co. Vice-president, F. W. Peters. General contractors, Westinghouse, Church, Kerr Co., New York.

Public Buildings, Churches, Schools, etc.

Bracebridge, Ont.
Addition to registry office. Sealed tenders addressed to the secretary, H. T. McNaughton, Parliament Bldgs., Toronto, will be received until June 29th. Plans at office of secretary and at Registry office, Bracebridge.

Charlebois Point (Lakeside above Valois Bay, Que.)
Club house for the Lake Shore Country Club. Provisional Chairman, Col. E. A. Whitehead, Montreal. Plans under consideration.

Bassano, Alta.
Church to cost $4,000 for Roman Catholic Congregation. Plans under consideration. Address all enquiries to Catholic Priest, Bassano, Alta.

Collingwood, Ont.
Post office and customs house. Philip [illegible], architect, is preparing plans under the Dominion Government. The building will be 62 x 120 ft., two storeys, of dressed sandstone construction; cost approximately $[illegible],000.

Fort Frances, Ont.
Alterations to Indian School Bldg. here and at Fort Alexander, Man. Tenders received until July 12th by Assistant Deputy and Secretary of Indian Affairs, J. D. McLean, Ottawa, Ont. Plans at Indian Offices, Winnipeg and Selkirk, and at offices of Indian agents at Kenora and Port Arthur.

Hamilton, Ont.
Fire station. Architect, Stewart & Witton, Hamilton. Chairman Fire & Water Committee, Ald. Norman Clark, c/o Adam Clark & Co., Main street west. Tenders called shortly.

St. Anne de la Pocaterre, Que.
Chapel for Convent of Ste. Anne de la Pocatiere. Plans considered. Hardwood flooring, church ornaments, pews, altar, electric fixtures, etc, required. For further information write the Superioress.

Lennoxville, Que.
It is contemplated to expend $100,000 on remodelling and restoring buildings. New equipment will also be required. Bishops College School; chairman Bd. of Directors, Sir H. Montagu Allan, Montreal, Que.

Port Hope, Ont.
Library. Plans at office of architect. W. A. Mahoney, Telephone Bldg., Guelph. Tenders for all trades received by secretary H. White, until July 5th.

Public lavatory, Jacques Cartier Sq., to be lined with marble and equipped with up-to-date sanitary appliances. Work in charge of Board of Control.

Quesnel, B.C.
Church to cost $12,500, for The Anglican Congregation. Architects, Twizell & Twizell Metropolitan Bldg., Vancouver. Native brick construction. Plans to be prepared.

Strathroy, Ont.
Hospital. The Council have decided to build on the site offered by Councillor Dunns. Plans to be prepared at once. Mayor, Mr. Owens.

St. Lambert, Que.
School. Board of Protestant School Commissioners will call shortly for tenders for construction of new wing to the St. Lambert school.

Saskatoon, Sask.
School, plumbing, heating and ventilating, for Saskatoon School Board. Sec., Wm. P. Bate, Box 1406, Saskatoon. Architect, David Webster, Kempthorne Block, Saskatoon. General contractors, Shannon Bros. & Cassidy. Saskatoon. Two-sty. and basement, 75 x 160. Tenders called. Plans at office of architect and the Winnipeg Builders Exchange.

Toronto, Ont.
Technical school, cost $500,000. Architects chosen, Ross & McFarlane, Montreal. Five storeys. Assembly room to seat 1,500 people, lecture theatre to seat [illegible] people, 17 laboratories, building trade dept., gymnasium and swimming pool 60 ft. long, 11 household science rooms, 2 lunch rooms and kitchen.

Picture theatre to cost $8,000, Danforth and Gough avenues, for A. E. [illegible]. Architect, R. A. Abraham, 23 Jordan street. Two-storeys, 39 x 130, brick. Tenders open.

Welland, Ont.
Band stand, brick and frame, for Park Commissioners. Sec., F. A. Lount. Ar-

chitect, W. E. C. Nazro, Plymouth Mass. City Clerk, Geo. Boyd. Tenders received until July 2nd.

Wilberforce, Ont.

School. Tenders received by secretary [illegible] S. Miller until July 6th.

Yarmouth, N.S.

Picture theatre. James S. McGray has purchased three-storey wooden building which he will remodel for theatre and will require the following fittings: all theatre seats, stage scenery and fittings, picture machines and all other necessary equipment.

CONTRACTS AWARDED

Berlin, Ont.

School to cost $23,000. Architect, Mr. Cowan. General contractor, Henry Branff, Berlin. 2-sty., brick and stone construction. Complete new seating equipment, blackboards, heating and plumbing required.

Calgary, Alta.

Public service stations—10th and 18th streets. Contracts awarded to H. S. Jones & Sons, 324 14th avenue west.

Two cottage schools to cost $4,500 each, Bridgeland and Tuxedo Park, for Calgary School Board, City Hall. Architect, H. McClelland, City Hall. General contractor. J. H. Whittleton, 17th ave. W. 2-sty., 36 x 30, frame construction.

Mission hall, cost $4,000, for Rev. D. A. McKillop, 810 14th ave. west, Calgary. General contractor, Mr. Johnston, Calgary. One storey, 33 x 50, brick and tile construction.

Drayton, Ont.

R. C. Church to cost $8,000, for St. Martins. Priest, Father Arnold, Drayton. Architect, Geo. Grey, Harriston. Mason, W. Smith, Drayton. Carpenter, Adame McConnell, Moorefield. Plumbing and heating, Mr. Patterson, Drayton. White brick and cement.

Kenora, Ont.

Fire hall to cost $20,875. Contractors, Sharman & Gilbert. Brick, stone and concrete.

Montreal, Que.

R. C. School to cost $60,000, Forsyth street. Architect, Dalbe Viau, 76 St. Gabriel street. General contractor, U. Boileau, 474 Gilford street. 3-sty., 32 x 126, brick and stone. School furniture required.

Public hall to cost $10,000, 1679 St. Catherine street, for R. A. Girard, 1259 St. Lawrence. Architect, Viau & Venne, 76 St. Gabriel. General contractor, P. Gagnon, 1265 St. Lawrence. 2-sty., 45 x 130, brick veneer.

Church to cost $110,000, Atwater st., for Fabrique St. Irenee, 384 Delisle St. Architect, Macduff & Lemieux, 364 University. General contractor, Filion & Freres, 865 Huntley street, and U. Pauze Fils, Greene avenue and Notre Dame west, Montreal. 77 x 140, cut stone and fireproof construction.

Church to cost $8,000, Ontario street E., for Baptist Congregation. Architect, J. R. Gardiner, Beaver Hall Hill. General contractor, Gray & Wighton, 244 Pine avenue west. 70 x 33, brick and stone.

Teachers residence to cost $30,000, Levis street, for R. C. School Commissioners, 140 Davidson street. Architect, Dalbe Viau, 76 St. Gabriel street. General contractor, 32 x 76, brick, fireproof construction.

Napanee, Ont.

Extension to church for St. Patrick's Roman Catholic Congregation. Architect, H. P. Smith, Kingston. Masonry, Alex. McCartney, Kingston. Carpenter, Andrew Raymond, Napanee. Plbg., tinsmithing, Boyle & Son, Napanee. Chancel 26 x 25; vestry 22 x 18.

Okotoks, Alta.

School (4 rooms). Architect, H. McCleland, City Hall, Calgary. General contractor, J. A. McPhail, 1139 6th avenue west, Calgary. 2-sty., brick and concrete.

Ottawa, Ont.

Fire hall to cost $25,000, Arthur street. Architect, F. C. Sullivan, Castle Bldg. General contractor, Murphy Bros. 2-sty. and tower, 85 x 42, brick.

Port Colborne, Ont.

School to cost $17,094. Architect, C. M. Borter, Niagara Falls, Ont. General contractor, Marcus Vanderburg, Welland. Plumbing and heating, A. D. Cross, Port Colborne. Electric wiring, Niagara Electrical Co., Niagara Falls. 1-sty. and basement.

Red Deer, Alta.

Hospital extension to cost $15,000. Chairman, F. H. Tallman. Architect, C. A. J. Sharman. Secretary, A. W. G. Allen. General contractor, C. T. Eline.

Extension to municipal offices to cost $11,000. Architects, Sharman, Barnes & Gibbs, Red Deer and Calgary. General contractor, Baird & McKenzie. Plumbing and heating, The Day Hardware Co. Electric wiring, The Western Electric Co. Sec-treas., A. T. Stephenson. 2-sty., brick veneer.

Stratford, Ont.

Market shelter to cost $12,070. General contractor, William Daly. Work to start soon; contract does not include the removal of weigh scales.

Toronto, Ont.

Sunday school, cost $35,000, for Riverdale Presbyterian Church, cor. Pape and Harcourt. Architects, Sharp & Brown, 18 Wellington street east. Builder, J. V. Denike, 138½ Ossington ave. Two storeys and basement, brick construction. Mason and carpentry work to be done by day labor. supervised by architect. Other contracts not yet let.

Sunday School building to cost $17,000, Gerrard and Leslie streets, for Riverdale Methodist Church. Architect, Thompson & Belfrey, 43 Victoria street. Mason and carpenter work, Skipper Bros., 76 Greenwood avenue.

Welland, Ont.

School to cost $24,000, Hellems ave. Architect, A. E. Nicholson, St. Catharines. Mason, J. Homan, Niagara Falls. Carpenter, J. E. Cutler, Welland. Plumbing and heating, J. H. Crow, Welland. Electric lighting, F. Clifford, Welland. Two-storey and basement, 98 x 70, brick, stone and cement.

Winnipeg, Man.

New scale building, cost $5,651, Market Square. Engineer, Mr. E. N. Ruttan. 223 James ave. General contractor, J. W. Astley. Engineer of Construction, City Yards.

Club house on Red River, for Winnipeg Hunt Club. General contractor, W. Eastwood. Plumbing and heating, John Plaxton Co. 1½-sty., 120 x 63, stucco finish. Stables, dog kennels, bowling greens and tennis courts included in the general construction.

Weyburn, Sask.

Theatre to cost $5,000, for T. E. McKenzie. Architect and contractor, B. Rooney. 2-sty., 44 x 130, brick and stone. All necessary equipment including 300 opera chairs required.

Business Buildings and Industrial Plants

Brandon, Man.

Elevator—to be rebuilt, for the Maple Leaf Milling Co. 133 ft. high; capacity of concrete storage tanks, 150,000 bush. A large amount of machinery required. Work to be completed by Aug. 15.

Hamilton, Ont.

Store and residence to cost $6,000. (cor. King and Fairleigh ave.) Tenders received by architect A. W. Peene, 2 King west, until June 30th. 2-sty. and basement.

Foundry building for Oliver Chilled Plow Works Co., Gilkinson street. Architect, Prake & Perrine, 2 King street west. Plans being prepared and tenders called after June 22nd.

Alterations to buildings to cost $3,000, John and Rebecca streets, for John E. Browne, MacNab street N. Architect. W. A. Edwards, 2 Hughson street. Present houses will be altered for stores and manufacturing building to be occupied by the Hamilton Stamp & Stencil Co. Window glass required.

Warehouse, Park and Merrick streets, for McLaren's Ltd., 25 McNab street. Architect, Mills & Hutton, Hamilton. President, W. H. McLaren. 3-sty., reinforced concrete. Tenders called shortly.

Ingersoll, Ont.

Extension to factory for T. Waterhouse Co. It is recommended that their request for the loan of $20,000 be granted by the town council. A large addition will be made to factory and a quantity of new machinery will be installed.

Le Pas, Man.

Extension to lumber mill for the Finger Lumber Co. Plans being prepared to double its present capacity.

London, Ont.

Factory to cost $25,000, for Electrical Specialties Co. Manager. W. Fowler. 2-sty., 150 x 50, brick and stone. Complete new machinery required. Plans prepared.

Macleod, Alta.

Brick block to cost $15,000, for R. G. McDonald. Architect, J. G. Hood. Tenders received after August 1st for a 2-sty. building for stores and offices.

Office equipment. Tenders received by secretary-treasurer until Aug. 15th for complete furnishings for offices in municipal building, also for jail, fire department and Board of Trade rooms.

Montreal, Que.

Restaurant to cost $8,000, for Jos. Godbout, 285 Roy street. 3-sty., 23 x 72, brick veneer. Plans ready.

Extension to plant, Notre Dame and Guy streets, for Northern Electric and

Mfg. Co. Architect, W. J. Carmichael. Bell Telephone Bldg. Plans being prepared for a fireproof building. Tenders to be called shortly.

Niagara Falls, Ont.

Store and office building, cor. Erie avenue and Park street, for W. L. Doran, River road. The site has been purchased and plans will be prepared at once.

St. John's, Que.

Jewelry factory for J. P. Meunier; stone and concrete. Plans ready.

St. Remi, Que.

Foundry for the Victoria Stone Co., Ltd. Stone and brick construction. Write Mayor Aime Bedard, St. Remi. Plans ready.

St. Thomas, Ont.

Evaporator. Geo. Doolittle has purchased the plant of the St. Thomas Canning Co. and will at once remodel it and instal complete equipment for an evaporator. New machinery and general interior fittings required.

Toronto, Ont.

Drug store and rooming house, cost $7,000, Wilton Crescent and Sherbourne street, for G. A. McTaggart, 268 Dovercourt road, builder. Architects, Redmond & Beggs, Kent Building. Three storeys, brick. Tenders open.

Store and residence to cost $5,000, Ossington and Carus avenues, for Henry Carter, 803 Bathurst street. Architect, W. J. Thompson, 576 Bloor street. 2-sty., 35 x 40, brick and stone. Plans drawn.

Walkerville, Ont.

Garage, Lincoln road, for C. M. Bennett. Frame construction. Tenders called.

Waterloo. Ont.

Office and bottling works to cost $30,000, for Kuntz Brewing Co. Architect, Mildner & Eison, 1018 Hammond Bldg., Detroit, Mich. 3-sty. and basement, 104 x 165, brick and concrete. Plans ready. The company will purchase material and sublet contracts.

Windsor, Ont.

Factory to cost $3,000. McDougall street, for C. Pangborn, Fort Wayne, Ind. 1-sty., 25 x 50, brick. Two buildings to be erected the same size. Tenders received by owner.

Store and flats to cost $3,000, cor. Bruce and London, for Wm. Burnie. London and Bruce avenue. 2-sty., 20 x 60, brick. Tenders received by architects Crane & Pennington, until June 29th.

Factory for the Mead Rotary Valve Motor Company, who have established temporary headquarters in the Windsor Machine Tool Company's factory, but intend to build a new factory. Mr. B. H. Pomeroy, manager.

Winnipeg, Man.

Stable, N.W. cor. Angus and Sutherland ave., for Brown and Rutherford 46 x 62, with 18-in. walls. Frame and metallic siding. Plans in preparation.

Factory for L. Jorundson, Builders' Exchange. Architect, Paul M. Clemens, 331 Garry street. 2-sty., 136 x 48, millwork, solid brick construction. 12 woodworking machines required. Tenders called.

Stores, Notre Dame and Charlotte, for Mrs. F. I. Crump. Architect, D. W. Bellhouse, Canada Bldg. 2-sty. and basement, 50 x 95, brick and steel construction. Tenders called.

Store to cost $3,900 for A. Beck, 515 Selkirk avenue. Architect, E. W. Crayston, 572 Ross avenue. 1-sty., 17 x 55, brick and stone. Tenders received by owner.

Stable, N.S. Alfred avenue between Arlington and Sinclair streets, for L. Rosenblat, 837 Alfred avenue, to accommodate 12 horses, to be 1½-sty., 28 x 32. Permit applied for.

Storage shed, E. side Olivia street between McDermot & Notre Dame avenue, for Claydon Bros., Furby Place. Corrugated iron, 50 x 60. Plans in preparation.

Stable, E.S. Pembina road between Carlaw and Weatherdon avenue, for Commonwealth Lumber Co. to accommodate 10 horses. Application made for permit.

CONTRACTS AWARDED

Belleville, Ont.

Boiler and machine shop for Marsh & Henthorn. Architect, F. H. Herbert, 65 Adelaide street east, Toronto. Mason, Mr. Manley. Structural steel, Dominion Bridge Company, Confederation Life Bldg., Toronto. Other contracts not yet awarded. One storey, brick and stone construction.

Calgary, Alta.

Store and bakery, cost $4,000. Architect and general contractor, G. Gallilli. Riverside street. Two storeys, 25 x 40, brick veneer.

Stores and offices, cost $10,000, for J. K. Lee & Co., 1st street east. Contractor, J. H. Bishop, Queen's Hotel. One storey, 47 x 130. brick and concrete.

Stores and offices, cost $10,000, for Dr. Lafferty. Architect, M. Wardrop, Clarence Block. General contractors, McNeil & Trainer, Box 14. One storey, 65 x 90, brick and concrete.

Store to cost $5,000, Bridgeland, for S. Shuter, 501 4th street E. General contractor, J. Wolff, 1141 Boulevard N.W. 2-sty., 25 x 36, brick veneer.

Stores to cost $8,500, 7th avenue., for Dr. J. D. Lafferty, Braeniar Lodge. Architect, L. R. Wardrop, 15 Clarence Blk. 1-sty., 50 x 130, brick.

Stores and apartments to cost $9,000, 11th street west, for W. J. Bridgeden, 1417 11th street west. General contractors, S. G. Tettey, 356 20th avenue N.W. 2-sty., 61 x 43, brick veneer.

Stores to cost $4,500, Ceepee avenue, for Lawrence Supply, Travis Blk. General contractor, W. Tosh, 225 14th ave. W. 1-sty., 75 x 50, frame and tile construction.

Store and apartments to cost $75,000, 10th avenue E., for J. Sharples, Westminster Block. Architect, Leo. Dowler. General contractor, Charles Zang. Plb. and heating, Grant Bros., Ltd. 2-sty. and basement, 130 x 70, brick.

Warehouse to cost $30,000, 10th ave. [illegible] for P. F. Scott. General contractor, J. McDiarmid, Box 2039. 4-sty., 100 x 45, brick and concrete.

Fonthill. Ont.

Factory, for Dominion Canners. Architect, T. Wooster. Mason, A. E. Ponsford, St. Johns, Ont. Carpenter, [illegible] Lumber Co., St. Thomas, Ont. 3-sty., Main Bldg., 45 x 125; store house, 45 x 165; process room, 22 x 85; engine room, 22 x 85; office, 30 x 30. Brick and cement.

Hamilton, Ont.

Laundry building to cost $4,500, Vine street, for Geo. Smythe, 141 Hunter st. west. General contractor, Evenden Bros. 31 St. Matthews avenue. 3-sty., 40 x 60, brick.

Steel plant for Steel Castings Syndicate. Architects, Brack & Perrine. 36 James street south. Manager, C. W. Sherman, c/o architects. Steel work. Hamilton Bridge Works Co., $41,000. General contractor, J. H. Christman & Sons, Gilkinson street.

Montreal, Que.

Stores to cost $3,000. Owner and contractor, O. Dubois, 104 Papineau avenue. 1-sty., 80 x 30, brick.

Foundry, Hutchison street, for Belgo-Canadian Steel Ltd., 720 Transportation Bldg. Architect, A. Baillot, Mance near Van Horne street. General contractor, C. Allard, Tetreaultville. Two-sty., 180 x 110, brick.

Storage building to cost $3,500, Ste. Christophe, for A. E. Morin, 860 St. Andre. General contractor, M. Herbert. 44 x 35, brick veneer.

Manufacturing flats to cost $13,000. Owner and general contractor, N. Blau, 611 St. Urbain. Architects, Dufort & Decary, 25 LaPatrie Bldg. Two stys., 26 x 24, brick and concrete.

Alterations to restaurant to cost $5,000, 435 St. Catherine west, for Standard Realties Co. Ltd., 179 St. James. Architect, House of Browne, 207 St. James street. General contractor, Jas. Young, 7 McCullough avenue, Outremont, Que. Stone and brick construction.

Office building to cost $1,000,000, for W. F. Lewis Estate, 30 Hospital street. Architect, K. G. Rea, Beaver Hall Hill. General contractor, E. G. Cape, Beardmore Bldg., 59 St. Peter street. 10-sty., fireproof construction, 100 x 120 ft.

Stable and shed to cost $50,000, Burke and City Councillors Sts. Owner and contractor, H. Morgan & Co., St. Catherine street west. Architect, Ralph Berrill, 15 Beaver Hall Hill. 3-sty., 147 x 114, brick and concrete.

Office building to cost $200,000, for La Sauvegarde Ins. Co. Contractor, C. E. Deakin. 11 St. Sacrament. Architects, Saxe & Archibald. 59 Beaver Hall Hill. 40 x 106 ft. 10-sty., fireproof.

Ottawa, Ont.

Warehouse to cost $2,500, Lewis St. Owner and contractor, W. D. Morris, 11 Somerset. 48 x 75, solid brick and concrete.

Warehouse to cost $5,000, Powell ave., for Howard Caldwell. General contractor, Hopper Bros., 162 Clemow avenue. Brick veneer.

Laundry to cost $4,500, Frank street, for St. Lukes Hospital Board. Architect, Horwood, Taylor & Horwood, Ottawa. General contractor, [illegible] 380 Crichton street. 65 x 30, brick and concrete.

Peterboro, Ont.

Storehouse to cost $3,500, Simcoe st., [illegible] General contractor, J. G. Graham, 122 Dub- [illegible] solid

(Continued on page 74)

Tenders and For Sale Department

REPORTER

We want an energetic representative in each town in Canada to report on building and engineering work to tell us where machinery, equipment, supplies or materials may be sold. Reports are paid for on the per item basis. It depends upon your own efforts how much you make. This is a profitable side line and there is good money in it for a hustler. Write to MacLean Daily Reports Limited, 220 King street West, Toronto.

Concrete Mixer

For Sale—Cheap

Two-thirds yard Polygon Mixer, mounted with steam engine, boiler and charging hopper. In first class condition. Price $450 F.O.B. Columbus, Ohio. Write for particulars to Jaeger Machinery Co., 216 W. Rich Street, Columbus, Ohio.

25-28

CITY OF MOOSE JAW,

SASKATCHEWAN

Tenders for Sewer and Water Extensions

Sealed tenders, marked "Tenders for Sewer and Water Extensions," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon on **Friday, June 28th, 1912**, for the laying of approximately 6¼ miles of 10-in. and 8-in. sewers and 6-in. water mains.

Plans, specifications and all information may be obtained from J. Antonisen, City Engineer.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
Moose Jaw, Sask., June 5, 1912. 24-26

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" Offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

TOWN OF ORILLIA

Extensions to

Sewerage System

Sealed tenders will be received up to 8 p.m. on **Wednesday, July 3rd, 1912**, addressed to C. E. Grant, Esq., Town Clerk, for the construction of approximately 16,200 lineal feet of sanitary sewers.

Plans, profiles and specifications are on file in the Town Engineer's office, Orillia, Ont.

The Corporation reserves the right to reject any or all tenders.

W. S. FROST, Esq., Mayor,
Orillia, Ont.

C. E. GRANT, Esq., Town Clerk,
Orillia, Ont.

W. K. GREENWOOD, Esq., B.A.Sc.,
Town Engineer,
Orillia, Ont.
25-26

TOWN OF WATROUS

PROVINCE OF SASKATCHEWAN

Water Works, Sewerage Works and Concrete Sidewalks

Notice to Contractors

Sealed tenders will be received by the undersigned Secretary-Treasurer of the Town of Watrous for the following works:

Contract "A"—All labor and certain materials necessary for laying water pipes and sewers.
Contract "B"—All labor and materials necessary for the construction of Pump House.
Contract "C"—This contract will be subdivided as follows:—

1. Furnishing materials and labor for and erecting Water Tower.
2. Furnishing materials and labor for and constructing concrete foundation for Water Tower.
3. Furnishing material and labor for and constructing frame housing for Water Tower.

Contract "D"—Furnishing Cast Iron Water Pipes and Special Castings.
Contract "E"—Furnishing Gate Valves, Fire Hydrants, etc.
Contract "G"—Furnishing and erecting Pumping Machinery.
Contract "I"—Furnishing material for and constructing Collecting Galleries and Suction Well.
Contract "S"—Furnishing Sewer Pipes and Junctions.
Contract "T"—Furnishing labor and materials for Concrete Walks.

Tenders will be received until 8 p.m. on Monday, July 15th, 1912, for Contracts A, C, D, E, S and T.

And until 8 p.m. on Wednesday, July 31st, 1912, for Contracts B, G and I.

Plans, specifications, etc., may be seen at the Town Hall, Watrous, or at the Engineers' Offices, Winnipeg and Toronto, on or after July 1st, 1912.

No tender necessarily accepted.

RICHARD B. DAVIDSON, Esq.,
Mayor.
JOSEPH GAYE, Esq., Ses.-Treasurer.
CHIPMAN & POWER, Engineers.
25-27

Special Notice to Contractors

Could supply you with any quantity of RELAYING RAILS or for REINFORCING CONCRETE at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. **11-t.f.**

Corporation of Smiths Falls

Concrete Sidewalks

Sealed tenders addressed to the undersigned and marked "Tender for Sidewalk," will be received until **Tuesday, the 2nd day of July, 1912**, at five o'clock p.m., for the building of 40,000 square feet of sidewalk, more or less.

Plans, specifications, instructions to bidders, and forms of tender may be seen at the office of S. B. Code, Town Engineer.

JAMES A. LEWIS,
Town Clerk.
25

Department of Railways and Canals

Hudson Bay Railway

Notice to Contractors

Sealed tenders addressed to the undersigned and endorsed "Tender for construction of Hudson Bay Railway" will be received at this office, until 16 o'clock, on **Thursday, the 1st of August**, for a section of about 68 miles from Thicket Portage to Split Lake Junction.

Plans, specifications and form of contract to be entered into can be seen on and after Friday, June 7th, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Chief Engineer of the Hudson Bay Railway, Winnipeg, at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind, that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $150,000, made payable to the order of the Minister of Railways and Canals, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheques thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 7th June, 1912.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.—23884. 26-27

Tenders for

Concrete Bridges

Sealed tenders, plainly marked as to contents, will be received at the office of the undersigned up to noon of **Tuesday, July 2nd, 1912**, for the construction of a Reinforced Concrete Girder Bridge with a central span of fifty (50) feet and two (2) shore spans of thirty (30) feet each, over the Don River, Lot 17, Con. 11, Township of York.

Plans and specifications and all necessary information may be obtained at the office of the undersigned, 57 Adelaide street east, Toronto.

The lowest or any tender not necessarily accepted.

FRANK BARBER,
Township Engineer.

Toronto, June 18, 1912. 26

Town of Carleton Place

(Ontario)

Sewerage and Water Supply

The Sewers and Water Commission of the Municipality of Carleton Place, Ontario, desire that Tenders be sent in to them on or before **Tuesday noon, 9th of July.**

The works generally consist of:—

(a) About five miles of sewers, 24 inch, 20 inch, 18 inch, 15 inch, 12 inch, 10 inch, 8 inch, 6 inch and appurtenances.

(b) About five miles of watermains, 12 inch, 10 inch, 8 inch, 6 inch, 5 inch and fire and other appurtenances.

The contract will include for the whole of the above for both construction and supply of all materials in accordance with plans and specifications which may be seen at the offices of the Consulting Engineer, Toronto, or the Resident Engineer, Carleton Place. Printed forms of tender and quantities supplied on application, along with deposit of $5.00, to be returned only on receipt of bona fide and filled in Tender and Quantities.

By order,
A. R. G. PEDEN,
(Clerk to the Sewers & Water Commission of Carleton Place)
T. AIRD MURRAY, Consulting Engineer,
303 Lumsden Bldg., Toronto, Ont.
B. G. MICHEL, Resident Engineer,
26 Carleton Place, Ont.

City of Moose Jaw, Sask

Tenders for the Erection of

High Pressure Pumps and Equipment

for the City of Moose Jaw

[illegible] Pumps and Equipment for the City of Moose Jaw," addressed to the City Commissioners, Moose Jaw, will be received up to 12 o'clock noon on **Monday, July 15th, 1912.**

Specifications and all information may be obtained from the City Commissioners, Moose Jaw.

A [illegible] per cent. of the contract price must accompany each tenderer's offer.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.

Moose Jaw, Sask., June, 1912 26-28

City of Moose Jaw, Sask.

Tenders for

Hydrants for High Pressure Service

Sealed tenders, marked "Tender for Hydrants for High Pressure Service," addressed to the City Commissioners, Moose Jaw, Sask., will be received up to 12 o'clock noon on **Wednesday, July 10th, 1912**, for the supply of sixty-nine (69) High Pressure Hydrants, delivered F.O.B. cars, Moose Jaw.

Plans, specifications and all information may be obtained from the offce of the City Commissioners, Moose Jaw,

Marked cheque for the sum of five per cent. of contract price must accompany each tender.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.

Moose Jaw, Sask., June, 1912. 26-27

City of Moose Jaw, Sask.

Tenders for

Water Gates for High Pressure Distribution Pipes

Sealed tenders, marked "Tenders for Water Gates for High Pressure Distribution Pipes," addressed to the City Commissioners, Moose, Jaw, Sask., will be received up to 12 o'clock noon on **Wednesday, July 10th, 1912.**

Plans, specifications and all information may be obtained at the offices of the City Commissioners, Moose Jaw.

Marked cheque for the sum of five per cent. of contract price must accompany each tender.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.

Moose Jaw, Sask., June, 1912. 26-27

The Municipality of the Village of Weston

(Ontario)

Sewerage and Storm Water Drainage

The Municipal Council of the Village of Weston, Ontario, desire that tenders be sent in to them on or before **Monday noon, the 8th of July.**

The works generally consist of:—

(a) About 9 miles of 15, 12, 10, 8 and 6 inch vitrified pipe sewers and house connection with ordinary gaskin and cement joints, with manhole and vent shafts, etc.

(b) About 4,300 feet of 36-inch reinforced concrete circular storm water conduit with manhole shafts, etc.

[illegible] and specifications, which may be seen at the offices of the Consulting Engineer, Toronto.

Printed forms of tender and quantities supplied on application upon deposit of $5.00, to be returned only upon receipt of bona fide and filled in Tender and Quantities.

By order,
J. H. TAYLOR, Clerk,
R. J. BULL, REEVE.
T. AIRD MURRAY, Consulting Engineer.
26 303 [illegible]

City of Moose Jaw, Sask.

Tenders for

Steam-Electric Machinery

Sealed tenders, marked "Tenders for Steam-Electric Machinery," addressed to the City Commissioners, Moose Jaw, Saskatchewan, will be received up to 12 o'clock noon of **Thursday, August 1st, 1912**, for the supply and delivery F.O.B. Moose Jaw, of one 500 kw. steam driven generating set.

Specifications and all information may be obtained upon application to J. D. Peters, Electrical Superintendent, Moose Jaw, or The Commercial Intelligence Branch, Board of Trade, 73 Basinghall street, London, England.

The lowest or any tender not necessarily accepted.

A. W. MAYBERY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.

Moose Jaw, Sask., June 21, 1912 27-29

City of Moose Jaw, Sask.

Tenders for

Cast Iron Water Pipes and Special Castings

Sealed tenders, marked "Tenders for Cast Iron Water Pipes and Special Castings," addressed to the City Commissioners, Moose Jaw, Sask., will be received up to 12 o'clock noon on **Wednesday, July 10th, 1912.**

Plans, specifications and all information may be obtained at the office of the City Commissioners, Moose Jaw.

Marked cheque for sum of five per cent. of contract price must accompany each tender.

The lowest or any tender not necessarily accepted.

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.

Moose Jaw, Sask., June, 1912. 26-27

Kindersley, Saskatchewan

Waterworks and Electric Light

Sealed tenders will be received by the undersigned till 20 o'clock on **Monday, 22nd July, 1912**, for the supply and delivery of the following materials:—

15,000 lin. ft. of 4-in. to 10-in. steel pipe and special castings, or alternatively :
400 tons of 4-in. to 10-in. cast iron pipe and special castings.
76 Gate Vales.
27 Hydrants.
[illegible] 100,000 [illegible]
Pressure filters.
Two return tubular boilers and stack.
Duplex Pump, 500 gallons per minute.
Simple Horizontal Engine, 130 h.p.
Steam Piping.
[illegible]
Cedar Poles, and transmission line equipment for 12,000 ft. of line.
6,000 lbs. Copper Wire.
[illegible]

[illegible] obtained at the office of the Engineers, The John [illegible] Winnipeg.

[illegible] cheque for five per cent. of the amount of the tender.

[illegible] accepted.

D. MacTAVISH,
[illegible]

Kindersley, Sask.,
[illegible]

Tenders for Bridge

[illegible] Ont., up to noon on Friday, [illegible]

[illegible]

BOWMAN & CONNOR,
26 36 Toronto Street, Toronto.

City of Moose Jaw, Sask.

Tenders for Sidewalks

Sealed tenders, marked "Tenders for Side-[illegible] City Commissioners, [illegible] twelve o'clock noon of Friday, July Twelfth, nineteen hundred and twelve, for the construction of approximately twelve miles of cement sidewalks, [illegible]

Plans, specifications and all information may be obtained from J. Antonisen, City Engineer.

[illegible] necessarily [illegible]

A. W. MAYBERRY,
L. W. RUNDLETT,
W. F. HEAL, City Commissioners.
[illegible] CONNELL, City Clerk.
[illegible], 1912 26-27

Town of High River
(Province of Alberta)

Notice to Contractors

Sealed tenders will be received by the Secretary Treasurer until 8 p.m. on **Tuesday, July 16th, 1912**, for the following works:—

Contract "B"—Pump House.
Contract "G"—Pumping Machinery.
Contract "I"—Pump Well.
Contract "P"—Ejector Station.
Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at High River or at the Engineer's offices, on and after June 29th.

No tender necessarily accepted.

R. A. WALLACE, Esq., Mayor.
GEO. E. MACK, Esq., Sec.-Treasurer.
CHIPMAN & POWER, Engineers,
26 Toronto and Winnipeg.

Town of Estevan
(Province of Saskatchewan)

Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on **Tuesday, July 16th, 1912**, for the construction of the following [illegible]

Contract "M"—Water Works Force Main.
Contract "P"—Water Works Pump House.
Contract "D"—Water Pipes.
[illegible]
Contract "I"—Pump Well.
[illegible]
Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at Estevan or at the Engineer's offices, on and after June 29th.

No tender necessarily accepted.

L. A. DUNCAN, Esq., Sec.-Treasurer,
Estevan, Sask.
CHIPMAN & POWER, Engineers,
26 Toronto and Winnipeg

Tenders for Bridge

Sealed tenders will be received by Edward Gaynor, Reeve of Peel Township, Arthur, Ont., up to noon on **Wednesday, July 10**, for the construction and erection of the 60 ft. Town's steel [illegible] with hand rail and concrete floor, also for concrete abutments for the same.

Plans and specifications for same may be seen by applying to Edward Gaynor, or at the office of the Engineers,

BOWMAN & CONNOR,
26 36 Toronto Street, Toronto.

TENDERS

Sealed tenders, addressed to John Bingham, Reeve of Esquesing, Box 416, Georgetown, will be received up till noon on **Friday, July 5th, 1912**, for the following works:—

1. For the concrete work on a combined bridge and dam on the River Credit at the paper mills, Georgetown.
2. For the steel beam superstructure of the above bridge.
3. For the concrete abutments and floor for a steel highway bridge, 100 feet span, over the River Credit on the 10th line, Esquesing Township.
4. For the steel superstructure of the above bridge.
5. For the construction of a concrete abutment under Capias Bridge in the Village of Glen Williams.

Plans and specifications for the above works may be seen at the Paper Mills, Georgetown, at the office of Mr. Moore, Reeve of Georgetown, or at the office of Malcolm & Rudd, Metropolitan Bank Building, Guelph.

A five per cent. deposit must accompany each of the tenders.

The lowest or any tenders not necessarily accepted.

J. HUTCHEON, Engineer,
26 Guelph, Ont.

Town of Battleford
(Saskatchewan)

Sealed tenders will be received by J. P. Marshall, Secretary-Treasurer of the Town of Battleford, Saskatchewan, until noon on **July 10th, 1912**, for the supply and delivery of the following machinery and materials and for the performance of certain works:

Tender "A"—For the supply, delivery and erection of two generators, exciters, and switchboard.
Tender "B"—For the supply, delivery and erection of pumps and motors.
Tender "C"—For the erection of power house and construction of reservoir.
Tender "D"—For the erection of sewage disposal works.
Tender "E"—For the supply and delivery of approximately 4,725 ft. of 8-in. steel water pipe and specials.
Tender "F"—Trenching and laying steel water pipe, setting valves, etc.
Tender "G"—For the supply and delivery of two pneumatic storage tanks.

Plans and specifications may be seen at the office of the "Canadian Engineer," Winnipeg, Toronto and Montreal, at the office of the Battleford Town Engineer and Electrical Engineer and at the Consulting Engineer's office, Bottomley Block, Saskatoon.

A marked cheque for five per cent. of the amount of the tender must accompany each bid.

The lowest or any tender not necessarily accepted.

J. P. MARSHALL, Sec.-Treasurer,
Battleford, Sask.
McARTHUR, MURPHY & UNDERWOOD,
Consulting Engineers,
26-27 Saskatoon, Sask.

CANADIAN AGENTS WANTED

Large United States Manufacturers of Paving Brick want representatives in Toronto, Montreal, Winnipeg and Vancouver. Brick is particularly suitable not only for regular street paving, but also for laying between street car tracks. Apply Box 517, Contract Record, Toronto, Ont.

Situations Wanted

DRAUGHTSMAN WANTED

A good general Draughtsman wanted, one accustomed to designing from sketches, and Detail Work. Apply stating salary expected, to P. C. Palin, Architect, Collingwood, Ont.

Position wanted as salesman or sales manager with a firm manufacturing or dealing in building, contracting or engineering equipment. Am familiar with up-to-date selling methods, and capable of managing a sales force. Box 518, Contract Record, Toronto, Ont. 25-26

Business Buildings and Industrial Plants

(Continued from page 71)

brick construction.

Renfrew, Ont.
Mill to cost $13,000, for Renfrew Woollen Mills Ltd. Engineer, J. A. Dietz. Architect. J. D. McNicoll. General contractor, Renfrew Mfg. Co. Plg. and heating, John Cowley.

Stamford, Ont.
Factory for T. G. Bright & Co., South End, P.O. Manager, T. G. Bright. General contractor, Vining Bros., Niagara Falls. 1-sty., 100 x 200, concrete block construction.

Toronto, Ont.
Warehouse, Dundas street, for General Fire Extinguisher Company, Architects, Ross & McFarlane, Montreal. F. H. Herbert, associate. General contractor, Henry Feedham, Crawford street. Two storeys and basement, brick and steel.

Warehouse, to cost $25,000, Bathurst and Wellington streets. for American Hat Frame Co. Architect, I. Feldman, 199 Yonge street. Mason, J. E. Webb Co., 7 Fisher street. Carpenter, W. Graham, 54 Nassau street. Roofing, A. B. Ormsby, Queen and George streets. Plastering, Taylor & Nesbit, 18 Havelock street. Painting, Jas. Casey, 222 Spadina avenue. Structural steel, Reid & Brown, 63 Esplanade street.

Walkerville, Ont.
Factory for Ford Motor Co. Architect and general contractors, Wells & Gray, Confederation Life Bldg., Toronto. 4-sty., 75 x 300, reinforced concrete and brick construction.

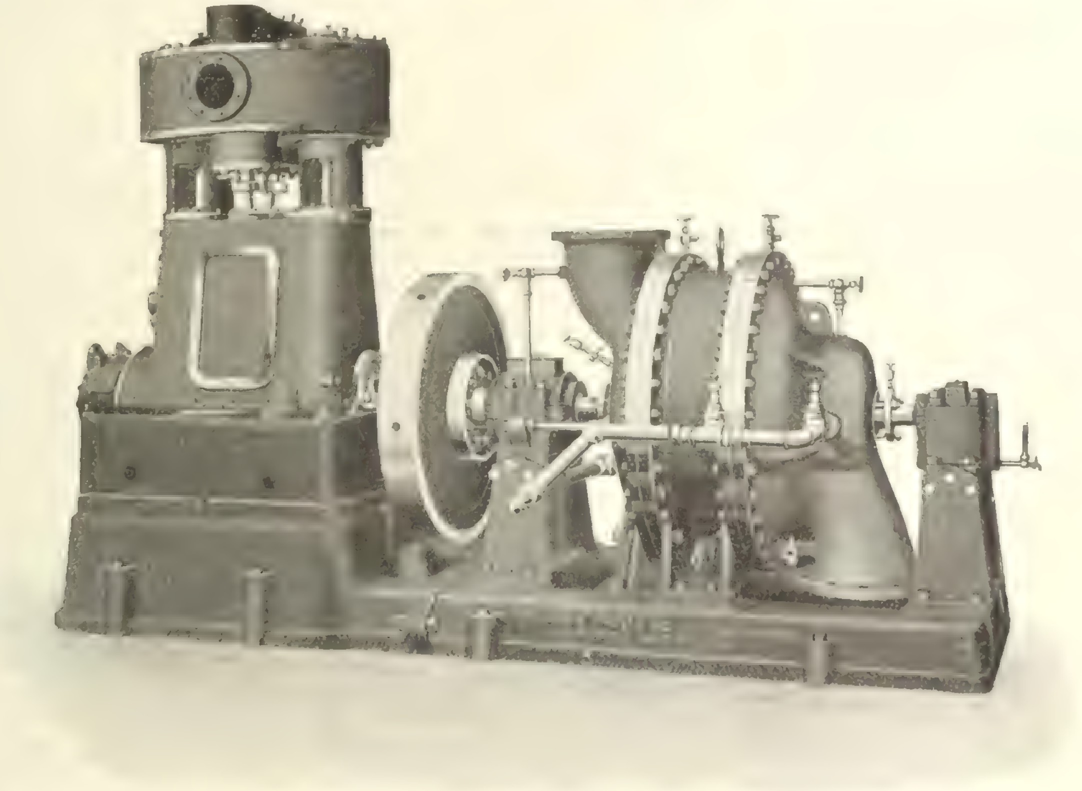
Store and residence to cost $7.000, Wyandotte street, for M. B. Squire. General contractor, H. Howe. Roofing, H. Cunningham. Iron work, Canada Bridge Co. Two stys., 25x60, brick and steel.

Welland, Ont.
Extension to Garret Roach Commercial Hotel. Owner and general contractor, W. J. Hickey, Welland. 2½-sty., 30 x 40. brick.

Weyburn, Sask.
Business block, Souris avenue, for Dr. B. M. Mitchell. Architect. B. O. Boyum. General contractor, F. Rooney. 1-sty., 100 x 120, brick and stone. Subcontracts not let yet.

STEAM DRIVEN TURBINE PUMP

which we made and installed for the City of Edmonton, Alta.



Six Million Imperial Gallons per 24 Hours Capacity—475 R. P. M.—80 ft. Head

¶ You can't get away from the value of experience in building a waterworks pump. The experience back of its making is directly responsible for its reliability.

¶ Inglis steam and motor driven pumps are designed and manufactured by a firm with the experience of half a century behind them, — a firm which has installed pumps in most of the principal cities and towns from coast to coast.

¶ From the smallest to the largest, one standard of quality holds, that standard representing economy, compactness, simplicity, accessibility, endurance, which distinguish pumps of the highest grade.

THE JOHN INGLIS COMPANY LIMITED

Engineers and Boiler Makers **Strachan Ave., TORONTO**

Winnipeg, Man.

Five stores to cost $10,000, Main St., for Lennon J. Shea, Main street. Architect, E. W. Crayston, [illegible] Ross ave. General contractor, S. B. Ritchie, Chambers of Commerce Bldg. 1-sty., 75 x 75, brick and stone.

Office building, cor. Notre Dame ave. and Garry street, for J. Lindsay. General contractor, National Construction Co. 10-sty., 140 ft. high, reinforced concrete construction.

Two stores, cost $10,000, Portage ave., for G. A. Muttlebery, 219 McDermot ave. Architect & General contractor, E. A. Johnstone, 395 Spadina ave. One sty., 30 x 110, brick and stone.

Residences

Calgary, Alta.

Five residences to cost $20,000, Elbow Park, for Dominion Home Builders, 407 Grain Exchange, architects and general contractors. 1-sty., 23 x 45. Plans ready.

Charlottetown, P.E.I.

Residence, cost $20,000, for Frank F. Taplin, Summerside. Architect, C. B. Chappell has prepared plans. Stone construction.

Danville, Que.

Residence, for Jos. Lafranc, "The Pinnacle." 2-sty., 28 x 36. Suggestions received for lighting, heating and roofing. Plans in preparation.

Goderich, Ont.

Parsonage to cost $6,000, for Methodist Church. Pastor, Rev. Mr. Brown, Goderich. Plans in preparation. Work to start shortly on tearing down old building.

Hamilton, Ont.

12 apartments to cost $13,000, James and Forest avenue, for Dr. Chas. Kelly, Bay St. S. Architects, Watt & Blackwell, Lister Bldg. 3-sty., 39 x 44; 1 new building to be built and 2 old ones remodelled. Tenders received until June 29th.

Hamilton, Ont.

Remodelling residence to cost $15,000 for R. L. Gunn, 86 Charlton avenue. Architect, J. D. Corrigan, 231 Catherine street N. Tenders open.

Apartment building, York and Oxford streets, for H. Levitt, 59 Victoria avenue N. Architect, J. D. Corrigan, 231 Catherine street N. Plans being prepared and tenders called shortly.

Niagara Falls, Ont.

Three residences—2-storey, for Eugene Menzie, Trennick Hotel. Tenders received by architect, J. W. Collins, Queen street.

Ottawa, Ont.

Residence to cost $6,000, Elm street, for Mrs. Louisa Blais, 135 Preston St. 48 x 48, double brick veneer. Plans under way.

Residence to cost $5,000, Besserer st., for Andrew Sutherland, 305 Gloucester. 24 x 35, brick and stone. Plans being prepared.

Two residences to cost $6,000, Mutchmore street, for Geo. A. Clark, 106 Kent. 18 x 35, brick veneer construction. Plans in preparation.

Residence to cost $7,000, for W. Skenkman, 226 Frill street. Cement block construction. Plans under consideration.

Residence to cost $3,500, for Mitchael Beauary, 167 Drummond street. 28 x 37, brick veneer. Plans being prepared.

Port Stanley, Ont.

Rectory to cost $6,000, for Anglican Congregation. Pastor, Canon Dowie. Plans will be prepared at once.

Toronto, Ont.

Addition to rooming house, cost $35,000, for L. Herbert Luke, 319 Sherbourne street. Architects, Redmond & Begg, Kent Bldg. Three storeys. brick. Tenders open.

Residence and garage to cost $15,000, for A. W. Austin, Spadina road. Architect, E. G. Bird, Traders Bank Bldg. 3-sty. and basement, brick. Tenders called.

Dwelling to cost $4,500, Pacific ave. Owner and builder, Harry Seddon, 31 Alma avenue. 2-sty., brick. Tenders open.

Three attached dwellings to cost $6,000, for E. J. Farnham, 31 Wyndham st. Architect, J. M. Cowan, 65 Adelaide st. E. 2-sty., brick. Tenders open.

Pair residences to cost $5,000, for Jos. Bailey, Shaw street. Architect, W. A. Rutter, 269 College street, has prepared plans and specifications.

Residence to cost $4,500, Munro Park avenue, for W. Geo. Hunt, 990 Bloor st. W. Two storeys, 25 x 32, brick. Tenders received by owner.

Residence to cost $6,000, Aberdeen avenue, for H. Tweedie, 7 Parkview Place. Architect. E. G. Wilson, 77 Victoria street. 2-sty., 18 x 61, brick, tar and gravel roofing. Tenders received by owner.

Apartments to cost $7,000, 263 Gladstone avenue, for J. Berenbaum, 80 Henry street. Architect, P. Rosenbes, 97 William street. 2-sty., brick. Plans drawn.

Residence to cost $3,000, E.S. Hilton street. Architect and builder, H. F. Saunders, 42 Leopold avenue. 2-sty., 23 x 34, brick. Tenders open.

Residence to cost $3,500, Heath street near Yonge street, for R. J. Cooper, 102 Balmoral avenue. Architect, W. Milliship, 193 Gilmore avenue. 2-sty., brick —plans ready.

Residence to cost $4,500, Indian road, for Miss A. G. Moran, 11 Osler avenue. Architect, J. H. Galloway, 23 Toronto street. 2-sty. and attic, 24 x 34, brick. Plans ready.

Vancouver, B.C.

Residence to cost $10,000, Shaughnessy Heights, for D. J. MacPhail. Architect, Twizell & Twizell, 11 Metropolitan Bldg. Stone and frame construction. Plans being prepared.

Residence to cost $8,000, Shaughnessy Heights, for Wm. C. Ditmars, c/o Armstrong-Morrison & Co. Architect, Twizell, & Twizell, Metropolitan Bldg. Frame and brick veneer. Plans being prepared.

Walkerville, Ont.

House for J. L. Hudson, Detroit, Mich. Old French Homestead on river front will be remodelled for a summer house with accommodation for forty guests.

Winnipeg, Man.

Residence, Crescent Place, for Howard Henry, c/o Imperial Oil Co. Architect, Hugh G. Holman, 11 Jordon Bldg. 2½ storeys, brick and stone. Tenders called July 26th.

Residence to cost $7,000, Machray ave., for A. Pellock, Matheson street, architect and builder. 2½-sty., 32 x 38, frame and stone. Plans prepared.

Residence, Home street, for J. C. Campbell & Co., 242 Somerset Bldg. 2½-sty., 28 x 36, brick and stone construction. Tenders close July 1st.

CONTRACTS AWARDED

Calgary, Alta.

Residence to cost $5,000, Bankview. Owner and contractor, J. B. Johnston, 2142 16th street west. 2-sty.. 30 x 28.

Residence to cost $4,500, 3rd avenue. Owner and contractor, W. J. Bailey, 808 4th avenue west. 2½-sty., 19 x 38, frame and concrete.

Residence to cost $5,000, Erlton. Owners and contractors. A. F. & S. H. Adams, 210 27th avenue. 2-sty., 32 x 34, frame.

Three residences to cost $8,000, Crescent Heights. Owner and contractor, M. G. Hunt, 414 12th avenue. 2-sty., 22 x 26, frame.

Residence, cost $6,000. Glencoe, for J. W. Campbell. Architects, Holman & Gotch, Herald Block. General contractor, A. H. McLean, 125 1st avenue west. Two storeys, 45 x 41, brick veneer.

Residence to cost $4,000, Bankview. Architects and contractors. Alliance Investment Co., 711 1st street west. 2-sty., 24 x 33, frame.

Parsonage to cost $5,000, 13th ave., for Baptist Church. General contractor. H. C. Cook, 705 15th street N.W. 2-sty., 23 x 36, frame.

Terrace to cost $15,000, 10th avenue E., for J. Hamilton. Elk Livery Stables. General contractor, D. McDonald, 1607 14th avenue west. 2½-sty., 30 x 122, brick veneer.

Residence to cost $4,000, Mount Royal. Owner and contractor, J. G. Porteous, 610 24th avenue west. 2-sty., 24 x 33.

Residence to cost $4,000, for C. W. Wright, 3002 Glencoe road. General contractor, Clark & Costin, 409 Travis Blk. 1-sty., 42 x 38.

Residence to cost $4,000, Park View, for J. Hawks, 320 14th street, northwest. General contractor, F. Rae, 318 14th street N.W. 2-sty., 19 x 36, frame and concrete.

Two residences to cost $6,000. Owner and contractors, Grimson & Brown, 1716 12th avenue west. 2-sty., 33 x 25, frame and concrete.

Residence to cost $4,000, Bankview. Owner and contractor, J. J. Davidson, 613 20th avenue west. 2-sty., 19 ft. 6 in. x 40 ft.

Apartments to cost $7,000, 13th avenue west. Owner and contractor, L. M. Dunfee, 1315 13th avenue west. 2-sty.. 32 x 48, brick veneer.

Residence to cost $5,000, Mt. Royal, for J. H. Fache. Architect and general contractor, W. Emory, 311 MacLean Block. 1½-sty., 25 x 34, frame construction.

Hamilton, Ont.

35 brick residences, John, Catherine and Brock streets, for Bennett &

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MODERN ELEVATORS

We build both plunger and electric elevators with patented improvements to secure better control and operation

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¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

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305 KENT BUILDING, TORONTO

[illegible] Mary & [illegible] streets. Cement work, [illegible], 82 Oak ave. Carpenter, [illegible]. Mason, R. [illegible] Maple avenue. Ptg., A. Crompton, [illegible] King William street. Tinsmith, Martin Smith, 11 Arthur avenue.

Millbrook, Ont.

Residence to cost $6,000, for Mrs. M. J. McBean, Millbrook. General contractor, H. Baker, 576 Charlotte street. [illegible] x [illegible], pressed brick and cement.

Montreal, Que.

Two residences, cost $9,000, Des Erables street. Owner and general contractor, J. B. Seguin, 928 St. Catherine street east. Three storeys, 24 x 60, brick and stone.

Residence to cost $5,500, Molson ave., for R. P. McDonald, 796 St. Denis street. Architect, A. G. McThom, Montreal. General contractor, Jos. Ethier, 637 Delanaudiere. 56 x 32, brick and stone.

Two residences to cost $5,000, St. Phillippe street. Owner and contractor, Alph. Chaurette, 1121 St. Antoine street. 3-sty., 38 x 52, brick construction.

Residence to cost $12,000, Delorimer avenue for Jos. Blanchet. Contractor, J. A. Ouellet, 250 Amherst street. General contractor, D. Larocque, 680 Laval avenue. 40 x 75, stone and brick construction.

Residence to cost $10,000, Mentana st., for T. Girard, 250 Amherst street. Architect, J. A. Ouellet, 250 Amherst st. General contractor, O. Filion & Freres, Montreal. 3-sty., 48 x 76, stone and brick construction.

Residence to cost $6,000, St. Denis street, for O. Adam, St. Dominique near Marie Anne street. Architect, J. A. Ouellet, 250 Amherst street. General contractor, A. Filion, 865 Huntley street. 3-sty., 80 x 25, brick and stone.

Residence to cost $3,000, Oxford ave. Owner and general contractor, P. Blais, 297 Prud'homme avenue. 2-sty., 25 x 60, brick veneer.

Residence to cost $6,000, for E. J. Guerin, 1364 St. Hubert. General contractor, D. Morel, 1020 Parthenais. 3-sty., 25 x 85, brick and stone.

Two residences to cost $6,000, for A. Desjardins, 558 Rivard. General contractor, E. Martel, 575 Frontenac St. 3-sty., 44 x 25, brick construction.

Residence to cost $5,000, Boyer St., for Thos. Roy, 32 Fullum street. General contractor, Alex. Lefebore. 3-sty., 25 x 30, brick veneer.

Two residences to cost $11,000, Hampton avenue. Owner and general contractor, F. Lachapelle, 2589 St. Hubert st. 2-sty., 50 x 64, pressed brick construction.

Residence to cost $15,000, 27 Ontario avenue, for C. J. Smith, 31 Ontario ave. Architect, Hogle & Davis, 30 St. Francois Xavier. General contractors, Church, Ross & Co., 40 Hospital street. 2½-sty., 40 x 70, concrete construction.

Residence to cost $6,000, St. Hubert, for O. Baillargeon, 1163 Delorimier ave. General contractor, J. R. Lavigneur, 279 Visitation street, 2½ sty., 25 x 56, stone.

Ottawa, Ont.

Residence to cost $6,000, McLeod St., for N. H. Goodspeed, address withheld. General contractor, N. Hollister, 512 Bay, Ottawa. 29 x 34, brick veneer.

Residence to cost $4,000, for J. W. Nelson, 130 3rd avenue. General contractor, Geo. Wilson, 341 Gloucester. 24 x 34, brick veneer.

Addition to residence to cost $3,000, Gloucester St. Owner, J. A. Thompson, 136 Gloucester street. General contractor, P. J. Belanger, 112 Clarence. Brick veneer.

Residence to cost $3,500, Frill street. Owner and contractor, F. W. Skuce, Britannia street. 30 x 50, double brick veneer.

Residence to cost $4,000, Centre street, for Wm. Austin, 109 York street. General contractor, Frank Barnes, 41 Sunnyside. 24 x 35, brick veneer.

7 residences to cost $14,000. Waverly street, for A. M. Power, 373 Nelson St. General contractor, R. A. Bingham, 22 Baird street. 123 x 23, brick and stone.

Two residences to cost $10,000, Frank street, for A. M. Power, 373 Nelson St. General contractor, R. A. Bingham, 22 Baird street. 85 x 33, and 25 x 20, brick and stone.

Residence to cost $6,000, Powell St., for W. S. Odell, 90 Somerset street. General contractor, N. Hollister, 152 Bay street. 26 x 36, brick veneer.

Rock Forest, Que.

Residence to cost $3,500 for City of Sherbrooke. Architect, L. N. Audit. General contractor, W. L. McSwiggan, London street. 2½-sty., 30 x 40.

Outremont, Que.

Residence, cost $5,000, Durocher St. Owner and contractor, W. Limoges. 3 storeys, 25 x 40, brick construction.

Residence, cost $7,000, Durocher St. Owner and contractor, P. Lapierre, 2228 Esplanade ave. 2½ storeys, 25 x 40, stone and brick.

Twp. Maryboro, Ont.

Residence to cost $3,000, for Egertson Benson, Rothsay, Ont. Architect and general contractor, David Downey, Stirton, Ont. Mason, W. Smith, Drayton, Ont. Ptg., glazing and plumbing, and heating, O. B. Henry, Drayton. 2-sty., 30 x 32, pressed brick construction.

Toronto, Ont.

Two detached residences to cost $10,000, Rosedale road. Architect and builder, C. J. Powley, 66 Parkway avenue. 2½-sty., brick.

Residence to cost $12,000, Russell Hill road, for Hugh Dunfield, 102 Yonge St. Architect, Thompson & Belfry, 43 Victoria street. Mason, Moore & Stewart, 203 Augusta avenue. Carpenter, Edwards & Son, 9 Webster avenue. Carpenter, Edwards & Son, 9 Webster avenue. 2½-sty., brick and stone.

Residence for Dr. A. M. Bell, 360 Danforth avenue. Architect, R. A. Abraham, 23 Jordan street. Mason, Thos. Brick, 716 Broadview avenue.

Two pair semi-detached dwellings to cost $10,000, Weston rood. Owner and builder, A. Rappaport, 2163 Dundas st. 2-sty., brick.

Residence, cost $21,000, Russell Hill road, for B. B. Cronyn, 199 Yonge St. Architect, Eden Smith & Son. Mason, Fussell & Son, 53 Poplar Plains road. Carpenter not yet awarded. Heating, plumbing and gas, not yet awarded. Electric wiring, McDonald & Willson, 12 Queen street east. Plastering, E. J. Curry, 37 DeLisle ave. Painting, R. H. Smith, 240 Church street. Galvanized iron, G. M. Bryan, 524 Yonge street. Weatherstrip, Wm. Malott, 699 Bloor W.

Winnipeg, Man.

9 residences to cost $21,600, Atlantic avenue, for F. W. Deutschman. Architect and contractor, Western Construction Co. 2-sty.

Residence, Wolseley street, for T. Wilson, 229 Spence street. Architect, Paul M. Clemens, 331 Garry street. Mason, Blow Bros., 680 Furby street. 2½-sty., 36 x 39, brick and stone. Tenders called by architect for interior finish and paraquet floors.

Residence to cost $3,000, 124 Mentana street. Owner and contractor, O. Carrier, 123a Amherst street. 3-sty., 24 x 40, stone.

Residence to cost $4,000. Architect and builder, Duncan D. McQuat, 1206 Wolseley avenue. 2½-sty., 24 x 32, frame.

Power Plants, Electricity and Telephones

Berlin, Ont.

Gas mains and purifiers for City of Berlin Light Commission. Plans will be prepared at once and about $30,000 will be expended on the work.

Healy Falls, Ont.

Gatehouse and racks for Eastern Power Co. Tenders received by engineers, Smith, Kerry & Chase, Confederation Life Bldg., Toronto. Plans at their offices and from Eastern Power Co., Winona, Ont.

St. Thomas, Ont.

Gas mains, Ross street, for Light, Heat & Power Dept. Engineer, E. H. Caughell. Estimates are being prepared by Acting Manager E. H. Caughell for the construction of about 2500 ft. of 6-in. gas main.

Vancouver, B.C.

Electrical equipment, for H. Birks & Sons, Ltd. Architect, Somervell & Putnam, 520 Pacific Bldg., Vancouver. H. C. Moss, 319 Pender street west, has designed the electrical equipment for the $450,000 office building on Granville and Georgia streets and is open for figures.

Winnipeg, Man.

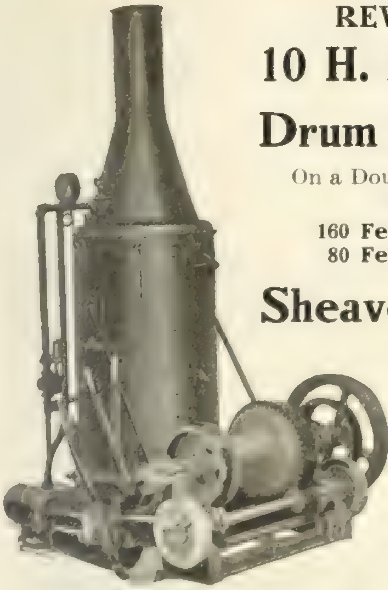
Street lighting system. Tenders received by Board of Control until June 28th for transformers, switch-boards, arc lamps, cut out etc. Plans at office of engineer, J. G. Glassco, 54 King street.

Woodstock, Ont.

Electric wiring of court house. Tenders received by Clerk, N. E. Birtch until July 5th. Plans at his office.

National Iron Works to Extend

The National Iron Works, Limited, of Toronto (Gordon F. Perry, General Manager), have obtained a permit for a large addition to their cast iron pipe foundry. The expenditure involved is $250,000 and the contract has been awarded to the Eastern Construction Company. Work is to commence at once.



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Drum Will Lift on a Single Line **2,600 Lbs.**

On a Double Line will Lift **5,200 Lbs.**

160 Feet per Minute
80 Feet per Minute

Sheave Will operate either a Single or a Double Platform Elevator safely and speedily, and always under perfect Steam and Brake Control.

Weight with Boiler, 4,000 lbs; without Boiler, 2,400 lbs. Light enough to be moved about easily.

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Notice the Wide Band Brake on the Sheave, ensuring perfect safety of elevator.

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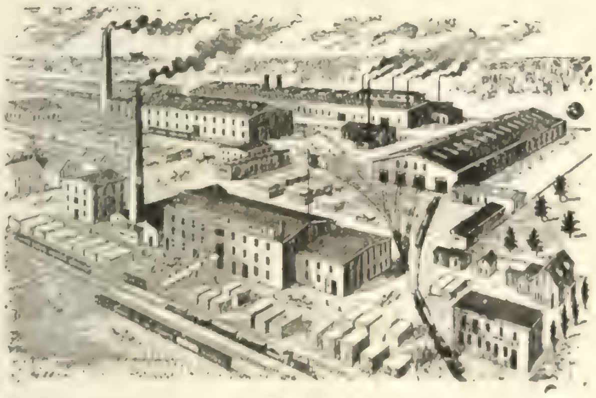

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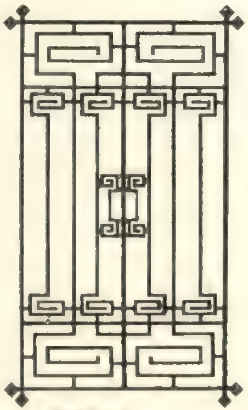
Halifax Sydney



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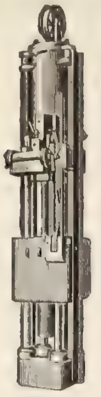
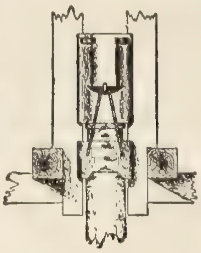
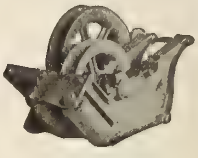


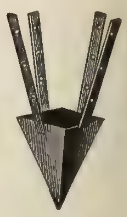
Steam Hammer

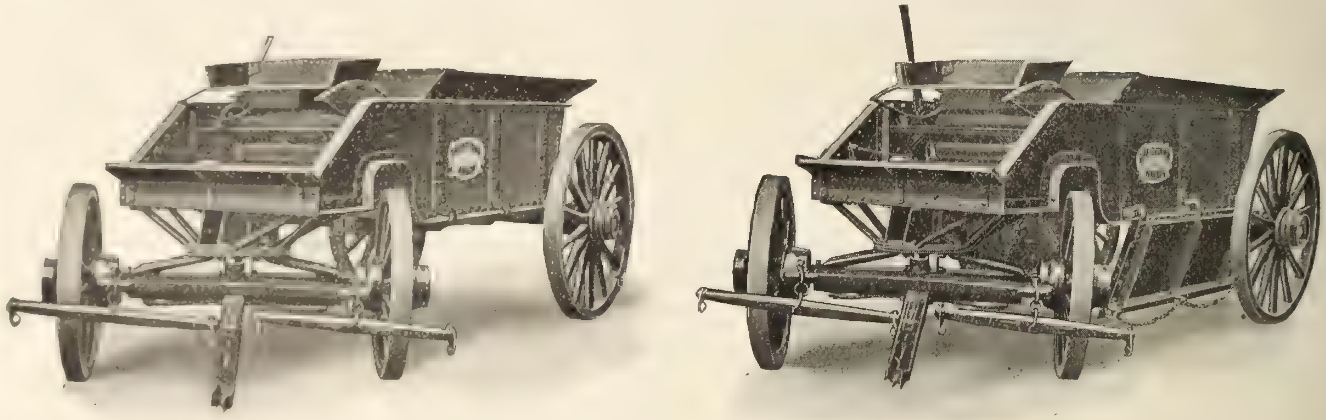


Casgrain Pile Cap



Perfect Head Block





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are the latest development in Dump Waggons, and the original cost is no higher than inferior makes.

Strong, light, everlasting, first cost is last cost.

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- 1—Parson Trench Machine, cuts trench 24 in. to 60 in. x 20 ft.
- 1—Municipal Trench Machine, cuts trench 24 in. to 72 in. x 20 ft.
- 1—26 ton Little Giant Traction Shovel.
- 1—45 ton Vulcan Track Shovel.
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- 1—No. 5 Austin Crusher with Corrugated Head and Back Gear.
- 1—No. 5 Gates Crusher Style "K" with smooth head in excellent condition.
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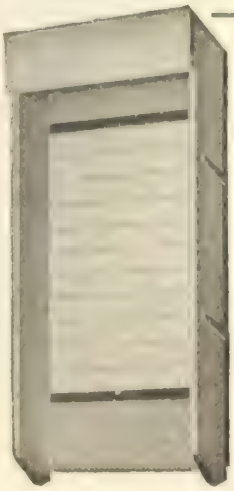

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Delivery yard runway 120-feet long, cranes 40-ft. span.

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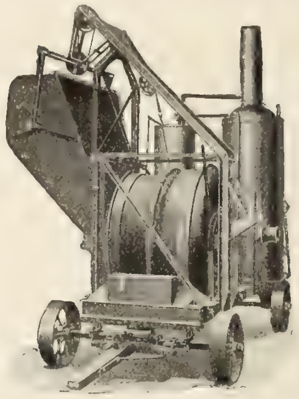
Chain Belt Mixer

just what he thinks of it.

IN MILWAUKEE there were about twenty concrete mixers sold in 1911, and fourteen were **Chain Belts.** Six of the leading concrete mixer concerns have their plants in Milwaukee. Draw your own conclusions, Mr. Contractor.



"The Mixer With the Bulge"

Where there is big construction work you will generally find a **Chain Belt Mixer** on the job. You owe it to yourself to investigate the **Chain Belt** before placing your order.

We also make elevators and gravity distributing systems. Send to-day to any of our agents for information.

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Milwaukee, Wis.

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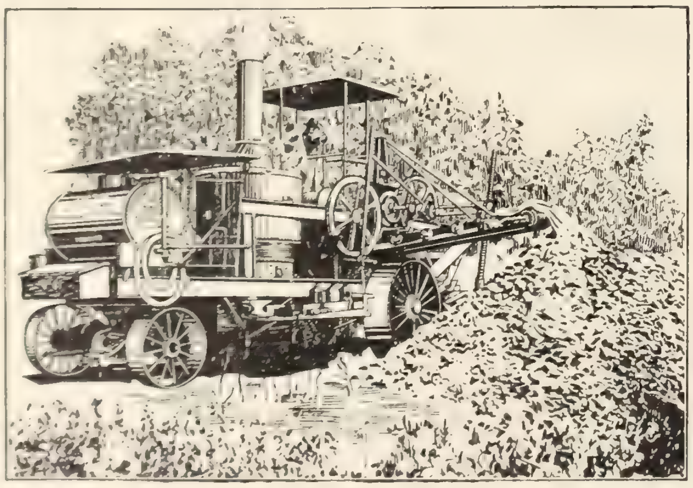

This year, labor is going to be scarce and very expensive. The amount of municipal work is going to be large and unless the Contractor uses the proper machine he will be behind time. If he gets one of our "Trenching Machines," which can make a cut all the way from 27 in. to 60 in. wide and any depth down to 20 ft., he will be sure to fulfil his engagements and save a big percentage of money.

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Lap Welded Steel Pipe

MADE IN SIZES

12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.
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The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

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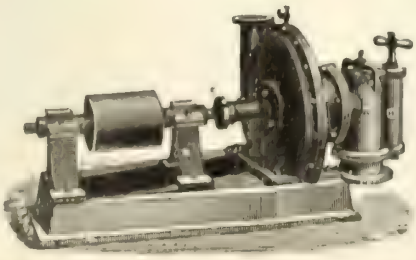

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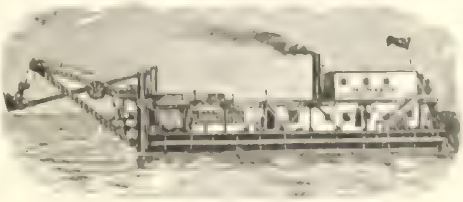

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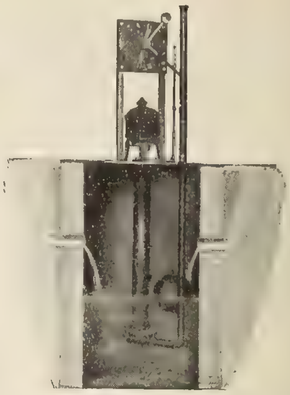

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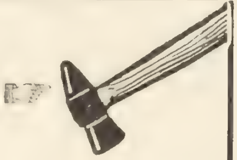

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in your crusher

and
have
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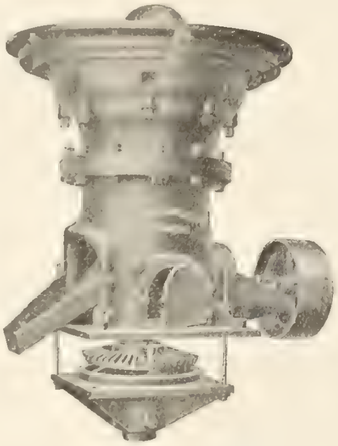
COME OUT
HERE
without injuring
your crusher



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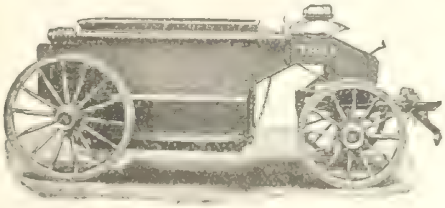

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It's a safe rule to judge goods by the men who handle them. Here's the company we keep. These firms are Canadian distributors for the TROY line. They carry complete stocks on hand all the time. When you want anything in the way of Dump Wagons, Traction Hauled Wagons or Dump Boxes, just see our agents or write us for Catalogue 2Z.

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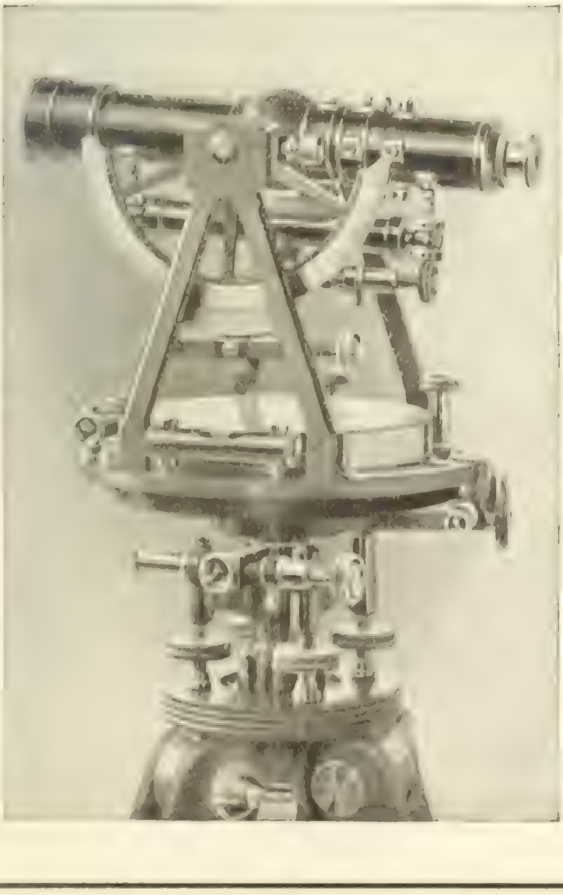

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appeals to any owner or municipality. We sell the sand and gravel that makes such concrete.

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When you are preparing your specifications and tender forms for your streets, boulevards or country roads be sure to make them wide enough to include

FINISHED DOLARWAY PAVEMENT

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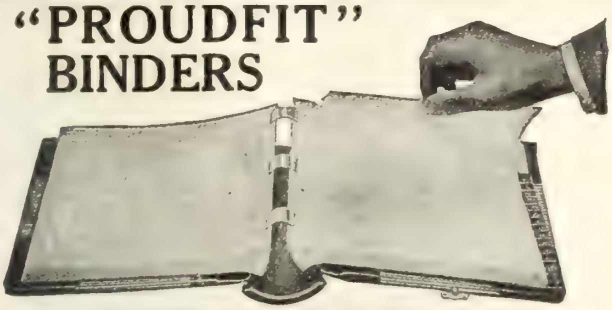

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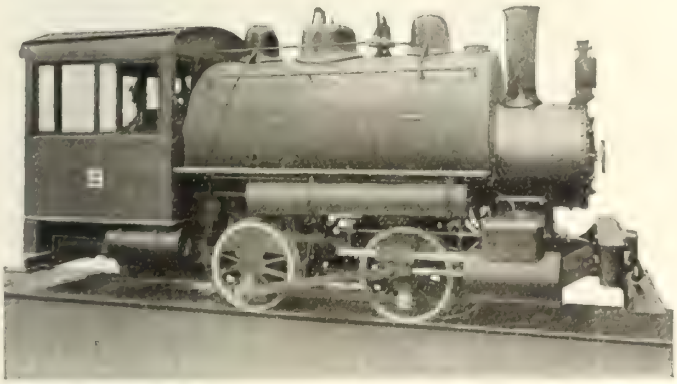

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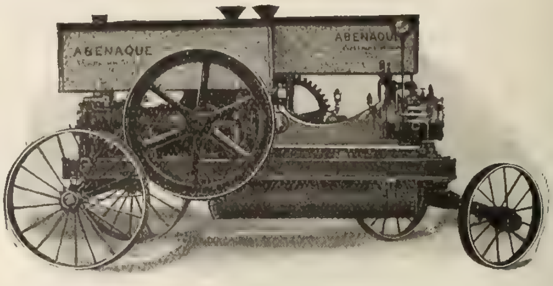
If you have any rock excavation for foundations, trench work, or any riveting, caulking, etc. to do you will find an Abenaque Outfit can be used with [illegible] economy, and to better advantage than either hand or steam driven tools. Write for catalog "M."



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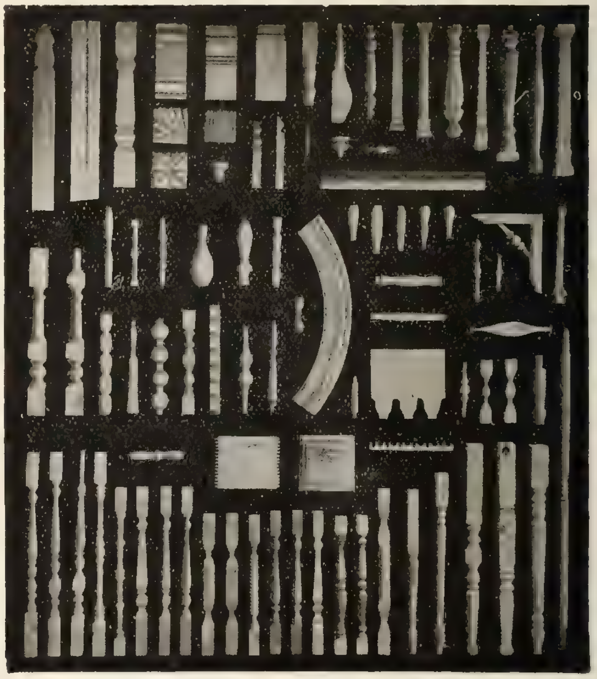

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No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 and 30 per cent. for approved specifications:—

		Star	D.D.
10 to 25	united inches	$4.25	$ 6.25
26 to 40	"	4.65	6.75
41 to 50	"	5.10	7.50
51 to 60	"	5.35	8.50
61 to 70	"	5.75	9.75
71 to 80	"	6.25	11.00
81 to 85	"	7.00	12.50
86 to 90	"	...	15.00
91 to 95	"	...	17.50
96 to 100	"	...	20.50
101 to 105	"	...	24.00
106 to 110	"	....	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.05	$4.40
40	3.25	4.75
50	3.65	5.55
60	3.90	6.00
70	4.15	6.50
80	4.65	7.00
85	5.10	7.85
90		9.10
95		9.90
100		11.00

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

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STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 and 5 per cent.

High grade compression work, 56 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.35

Square head brass cocks, 60 per cent.

Boilers—Galvanized Iron Range

30 gallon, standard, $4.50; extra heavy, $7.00.

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16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe

Lead pipe, 20 per cent. off; lead waste, 20 per cent. off; caulking lead, 5½ cents. per lb.; traps and bends, 45 per cent.

Iron Pipe

Size (per 100 ft.)		Black.			Galvanized
¼ inch	....	$1.87	¼ inch	....	$2.70
⅜ "	....	1.87	⅜ "	2.70	2.57
½ "	2.47	2.35	½ "	3.40	3.23
¾ "	2.88	2.75	¾ "	4.03	3.83
1 "	4.13	3.93	1 "	5.78	5.48
1¼ "	5.63	5.35	1¼ "	7.88	7.49
1½ "	6.75	6.44	1½ "	9.45	8.98
2 "	8.46	8.05	2 "	12.06	11.46
2½ "	13.51	12.85	2½ "	19.26	18.30
3 "	17.74	16.86	3 "	25.29	24.03

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 60; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 and 10 per cent.; fittings, 70 and 10 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.65.

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Binder stone, $1.30 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and leads, in the rough, delivered, 40 cents per foot.

Rubble Stone in car lots, $1.30 per ton.

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Lime, per cwt., delivered, not less than 1,500 lbs., 38 cents.

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Manilla Rope, best, per pound, 16½ cents.

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Pure White Lead, ground in oil, $7.25 per 100 lbs.

Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.

Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

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Raw Linseed Oil, in barrels, 98c. per gallon of 9 lbs.

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Pure Red Lead, dry, $6 to $7 per 100 lbs.

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Sawmill of Graves-Bigwood Co., Ltd., destroyed by fire, at estimated loss $[illegible]000. The company [illegible] rebuild immediately.

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The [illegible] Company is about to make extensive repairs to its factory. The town plans building a town hall to cost approximately $40,000 and a new college will also be erected.

Lake Megantic, Que.

The [illegible] sawmill completely destroyed by fire including all up-to-date sawmill machinery.

Levis, Que.

Residence, $4,000, on Wolfe street, belonging to A. Turgeon, occupied by J. B. Belanger, destroyed by fire. Loss $4,000.

Noyan Jct., Que.

Residence of C. Derick burned. Loss $8,000. To be rebuilt.

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Mill of Parkhill Milling Co., Messrs. Hartman & Ziler, proprietors, completely destroyed by fire. Loss $15,000. Plans will be prepared at once for a much larger building and complete new machinery will be required.

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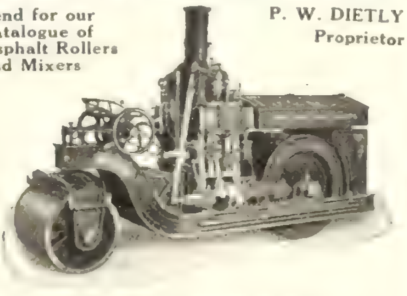

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Elevating and Conveying Machinery for Coal and Ore, (Robins Patents).

Trippers and Weightometers.

Steel Bank Heads, Ore Bridges, Piers, Coaling Stations designed, erected and equipped.

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Beams, Angles, Channels and Plates carried in Stock.

Sole Canadian Manufacturers for

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A little booklet explaining many interesting features concerning the origination and perfecting of "steel interiors." It is agreed by authorities and proven by many actual and severe tests that no matter what precautions you take to fireproof a building, the structure is not nor cannot be "fireproof in reality" if inflammable trim is used, which permits the fire to spread from room to room and floor to floor.

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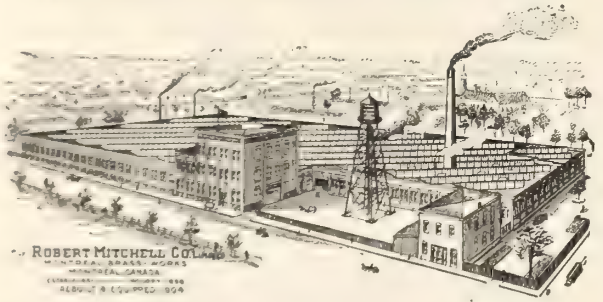

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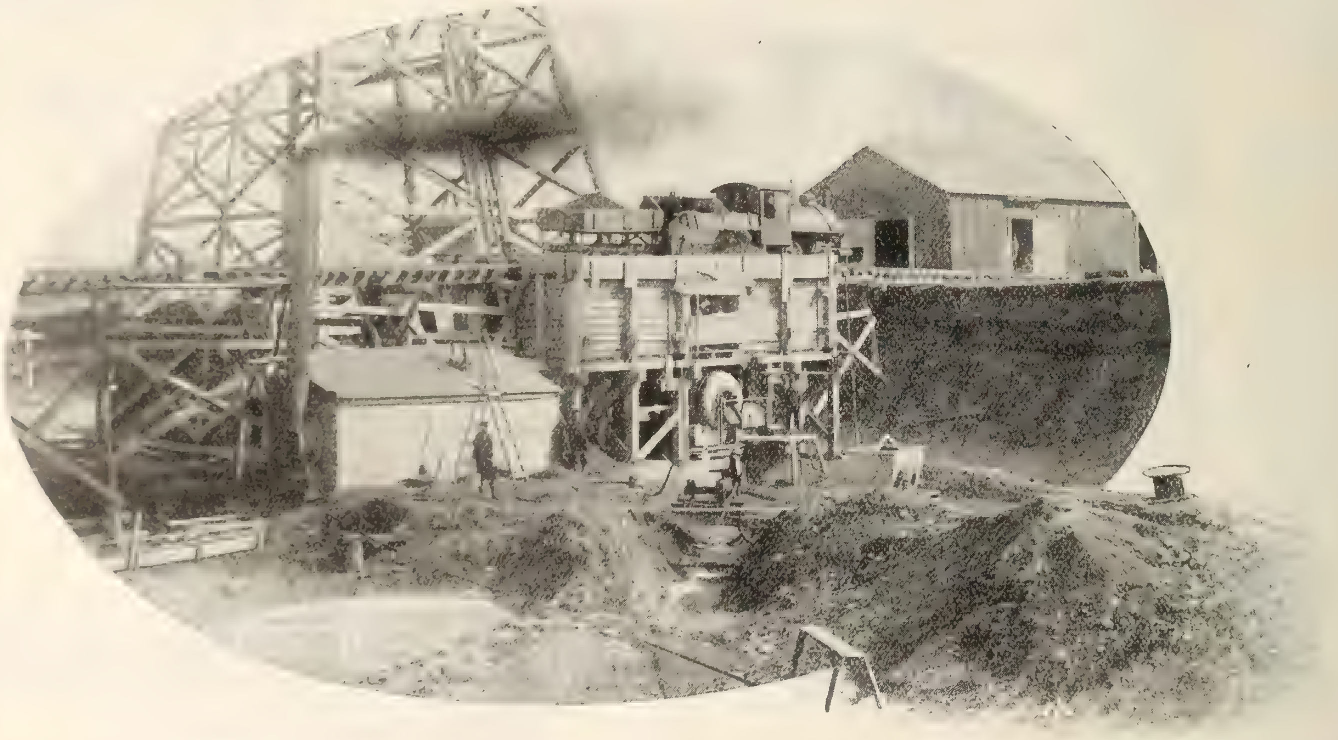

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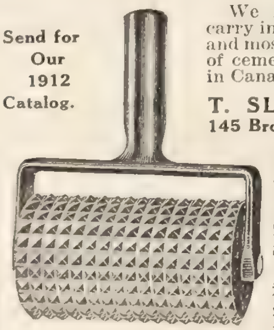

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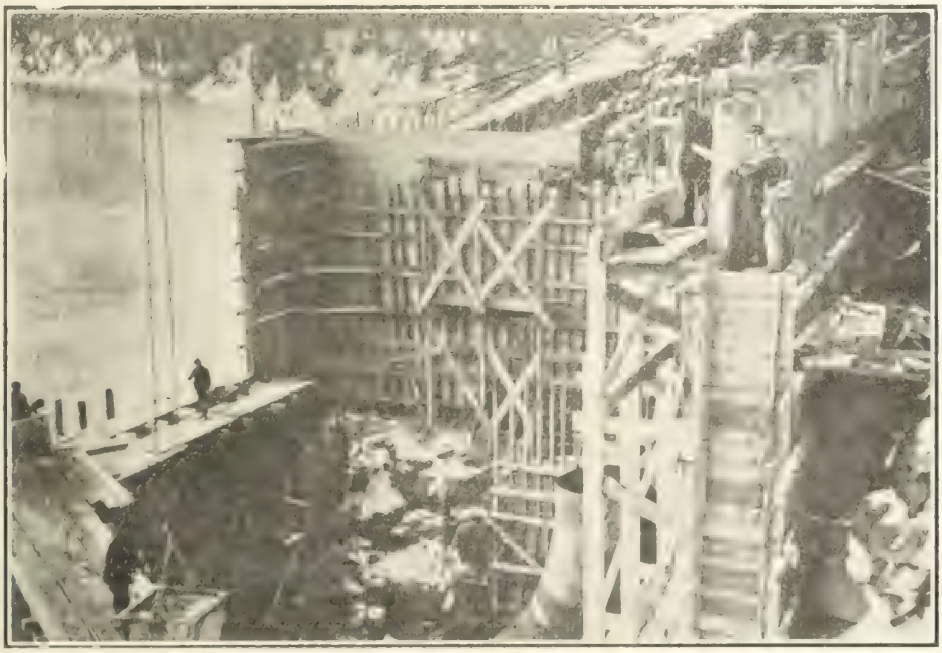

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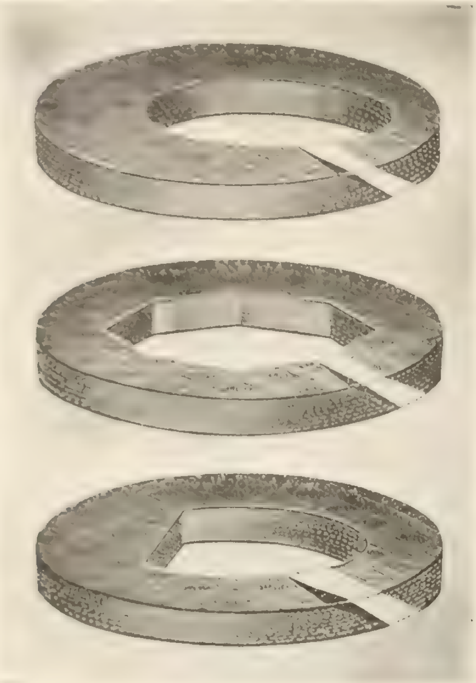

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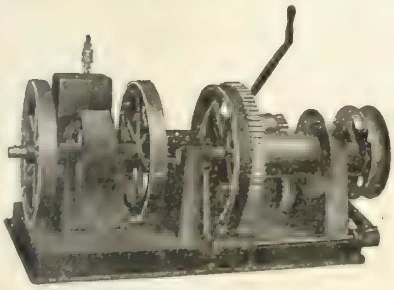

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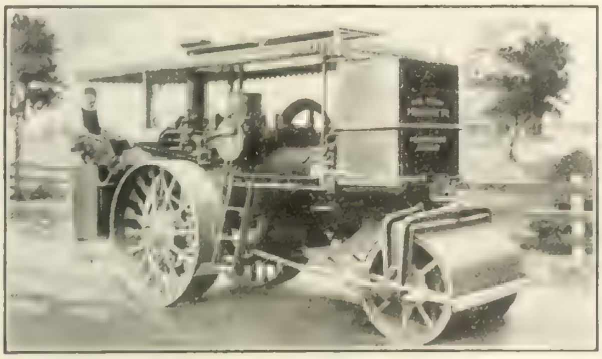

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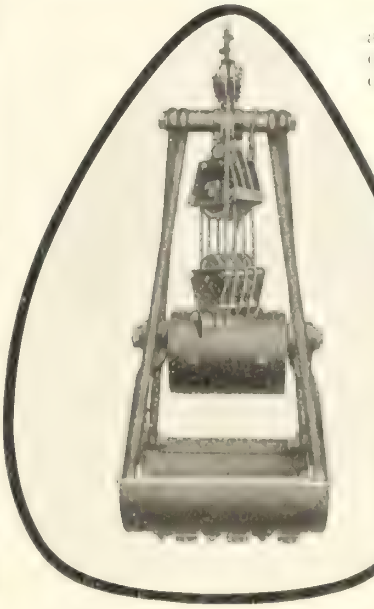

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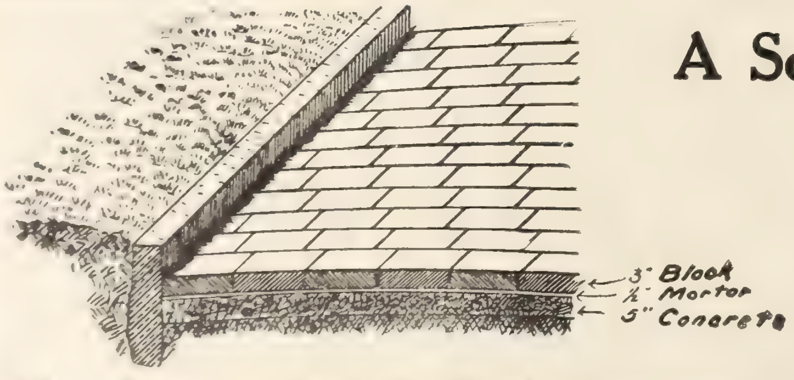

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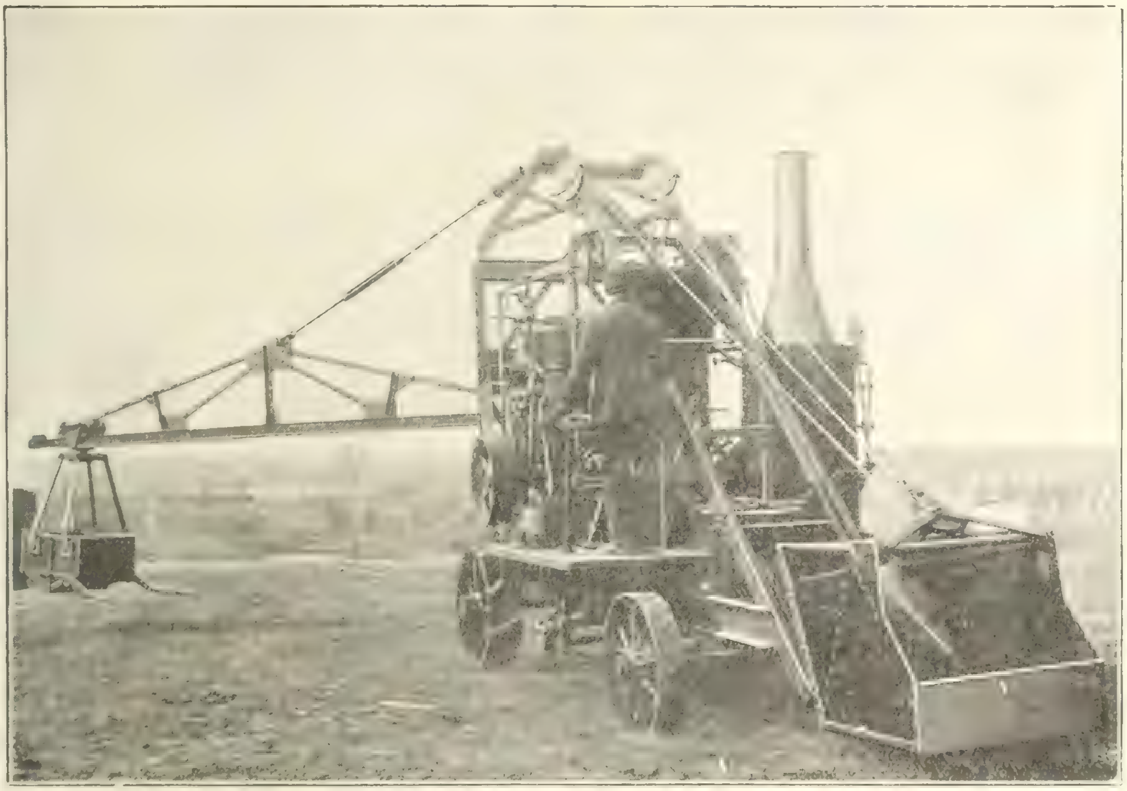

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Every day this company issues reports to their subscribers—each report on a separate slip—supplying information on the business offering them, from every Province of Canada. News of present and prospective markets for the goods you sell, right up-to-the-minute, accurate and complete, this company lays before you on your desk, and does it every day.

Besides these reports, subscribers are supplied with additional information on subjects concerning their own business, which, as is usually the case, they are unable to obtain at the time when this information would be of most value, or is of such a nature that it is desirable to obtain it from an independent, yet reliable source.

With their head office in Toronto and branches in Montreal, Winnipeg, and Vancouver, this splendidly equipped organization, through its staff of reporters and correspondents, stretches out and into the most remote cities, towns and villages, and quietly, quickly and surely gathers information which no man in business could ever get together for himself. They render a reliable, peculiar, unique and distinct service for business men.

The whole idea of their service is founded on PERSONAL REPRESENTATION. This company is in daily touch with all the principal towns and cities of Canada. They know every day what business is offering for firms who sell building and engineering supplies, apparatus or equipment.

Their representatives are trained men—men skilled in ferreting out news. They obtain definite, complete and accurate reports by personally interviewing people in authority. Work is reported in its earliest stages, followed up closely, and supplementary reports issued as the work progresses and the various contracts are awarded. Reports are issued upon work from its inception to completion—buildings are followed from foundation to furnishing.

They place this information before their subscribers so that each can judge for himself what business is worth getting after—which offers the most profit—which he can handle to the best advantage. It guards against oversight and loss of opportunity. It is an efficient aid to the hustling salesman and a check upon the indolent. It enables the home office to keep a watchful eye on the enterprise of their agents—to do aggressive sales work by getting in touch with the prospect at the earliest possible moment—to get after business FIRST.

All business-men, merchants and investors succeed and fail just as they are able to know conditions as they are TO-DAY and what to expect TO-MORROW. Most of us have a slipshod, hap-hazard, intuitive way of knowing what business is offering. MacLean Daily Reports reduces the thing to a definite science for our benefit.

Many business houses are using this service exclusively in their Promotion and Sales Department, and they date their big successes from the time they began to use these reports.

There is no other concern in Canada that gives a service similar to or substitutive for MacLean Daily Reports. Their organization thoroughly covers the Dominion, and supplies news, economically and efficiently, of present and prospective markets for the goods their subscribers sell.

The simple point is that in business we need every assistance we can possibly bring to bear in conducting our affairs wisely and well. The able pilot on the St. Lawrence is the man who knows the channel and is able to keep his craft in safe waters. It is exactly so in business. The business pilot needs the map MacLean Daily Reports will supply. Get wise and write to MacLean Daily Reports Limited, [illegible] King street west, Toronto, and learn how they can help you to help yourself.

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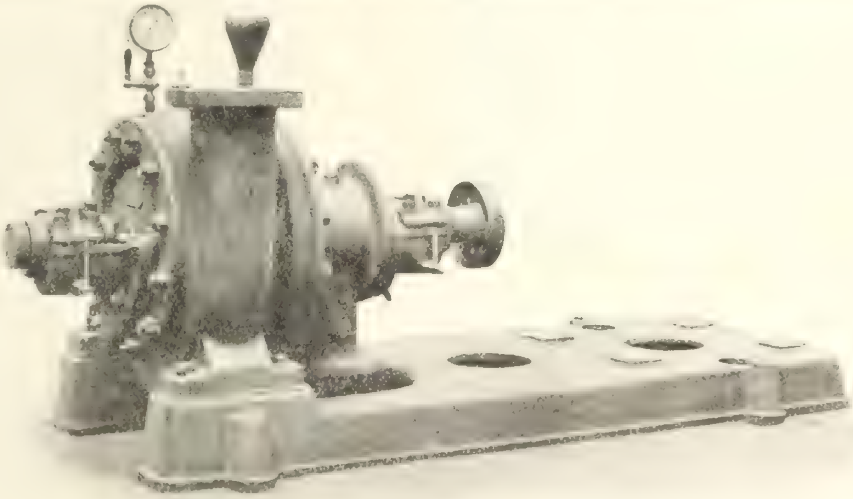

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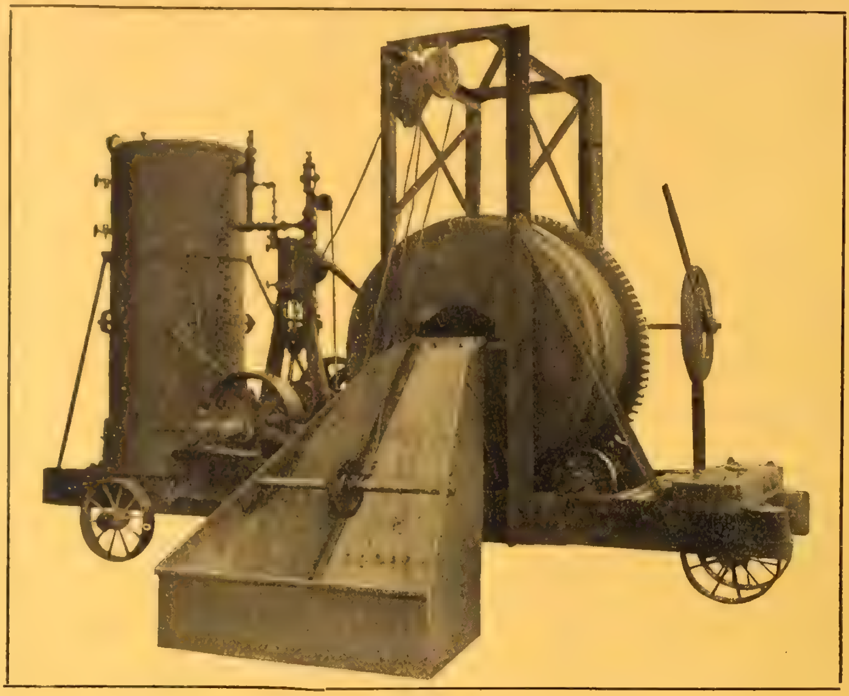

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